

# RAMSAY'S ARCHITECTURAL CATALOGUE



1931 EDITION



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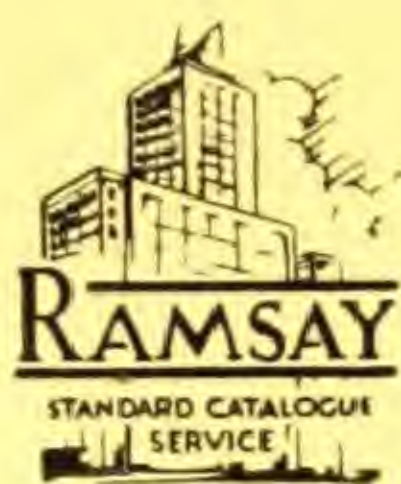
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# PREFACE

**T**HIS first edition of Ramsay's Architectural Catalogue, containing the Bound Catalogues and other data of some 100 Manufacturers, is lent GRATIS to every practising Architect and Consulting Engineer in Australia, for the purpose of providing them, each year, with an up-to-date standard Catalogue, containing a complete reference to the use and scope of Building Materials and Equipment. Furthermore, the Catalogue provides such information in a technical manner so that Architects and Engineers may easily select, specify, and place in their works the listed manufacturers' material or product.

The Publishers need hardly stress the value of such a book to the practitioner, for its appearance is the outcome of a long-felt desire on the part of Architect and Engineer for such a self-contained volume on the available building materials and equipment. It is hoped that the recipient of this Catalogue will justify the Publishers' claim, "that it will occupy a place of mutual usefulness in the office and drafting room."

The study of the manufacturer's product, the compilation of the necessary technical matter, and the preparation of certain drawings and specifications by the Architectural Staff of Ramsay's Catalogue, entailing eighteen months' work, have resulted, we believe, in some contribution being made to the science of building in Australia, and the use of modern materials. This fact, together with the inclusion of existing data, should provide some sort of basis for a more intimate and practical study of standardisation in the manufacture and use of building materials available in Australia, and thus help to eliminate much that is adding to the cost of building.

To this end the Publishers will welcome, in view of succeeding editions, kindly criticism and attention being called to any errors, which cannot be entirely eliminated in a work of this nature, however conscientiously prepared.

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September 1931.



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## ERRATA.

- Page 36—The line reading: "For Other Products, etc." should read:—"For Other Products, See Pages 76, 120, 175, 251 and 492."  
The word "Kangaroo" in the right-hand top corner should be substituted for the trade mark of D. & W. Chandler Ltd.
- Page 38—The 8th line from the bottom of the page (left column) should read:—Architect: Robison Bros. & Co. Pty. Ltd.
- Page 43—In the letterpress of the second column the reference to the plate on page 51 should read "Page 44."
- Page 54—In the letterpress of the Specification the two references to the matter on page 16 should read "Page 47."
- Page 62—In the paragraph: "Representative Work—Adelaide," the Architects for the Shell Company Offices and Hotel Ambassadors has been omitted. The Architects for these buildings are: Messrs. E. H. McMichael & Harris.
- Page 76—The line reading: "For Other Products, etc." should read:—"For Other Products, See Pages 36, 120, 175, 251 and 492."
- Page 97—The word "Brone" on the drawing should be Bronze.
- Page 333—In the business information at the head of this page the address of the Works should be 304-308 Spencer Street.
- Page 381—In the second column at the side of the name: "The Greengate and Irwell Rubber Co. Ltd." the words "Representative—Not yet appointed" should be replaced by "Sydney—A. Beale Pritchett. Melbourne—Allen S. Duke Pty. Ltd."



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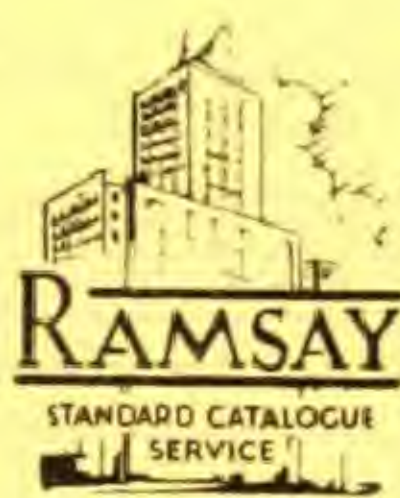
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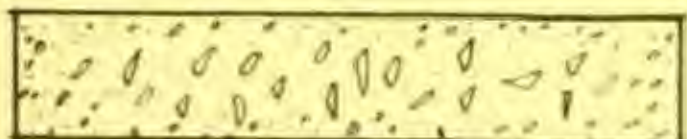


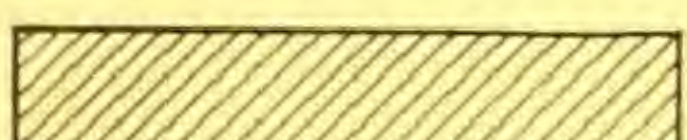

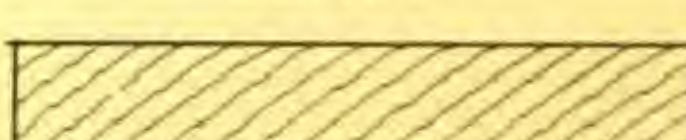

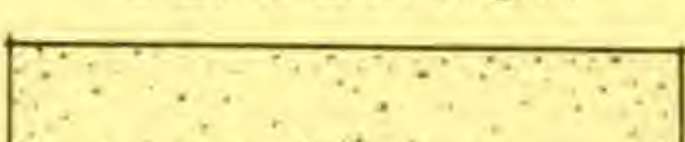
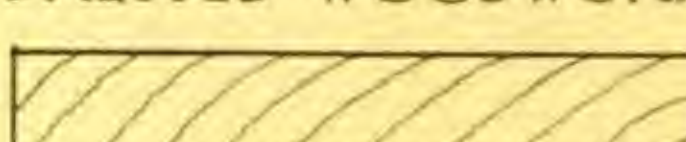
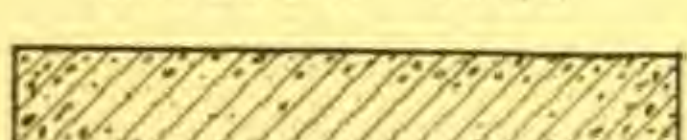
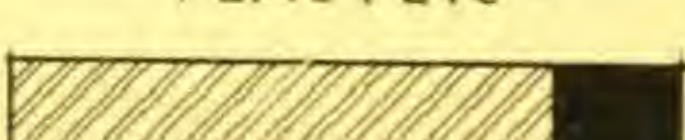
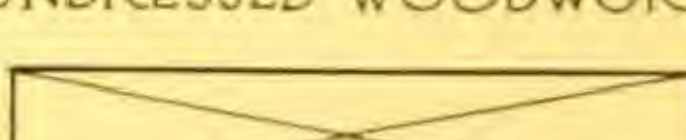
Tracing Papers, smooth surface, textured surface, highly transparent and strong. Natural White Detail Papers for drafting details sufficiently transparent for copies to be made if required. Tracing Linen, all brands and sizes—30 in., 36 in., 40 in., 42 in., 54 in. widths. Cartridge Papers, sheets or rolls, light or heavy weight. Whatman's 30 in. x 22 in., 40 in. x 27 in., 54 in. x 30 in., rough or smooth. Sensitized Papers, best brands, locally manufactured, guaranteed fresh.

### Mathematical Instruments

Dividers, Compasses, Bow Pens, Single Spring Bows, Drawing Pens, etc., etc.

### Other Requisites

Educational Maps, Drawing Boards, Tee Squares, Set Squares, Scale Rules, Pencils, Charcoal, Inks, Colours, Brushes, Palettes and Tiles, India Rubbers, Ink Erasers, Penknives, Drawing Pins, Protractors, Clinographs, French Wooden Curves, Ticking Clips, Rules, Folding Measuring Rods, Tape, Notebooks, Glue, Blotting Paper, Sensitized Paper, etc.

 <b>STONE</b>	 <b>MARBLE</b>	 <b>EARTH</b>
 <b>CONCRETE</b>	 <b>TILE, SLATE OR CORK.</b>	 <b>GLASS</b>
 <b>BRICKWORK</b>	 <b>COMPOSITION</b>	 <b>DRESSED WOODWORK</b>
 <b>HOLLOW TILE</b>	 <b>PLASTER</b>	 <b>UNDRESSED WOODWORK</b>
 <b>ARCHITECTURAL TERRA-COTTA</b>	 <b>METAL</b> <small>SOLID SECTIONS AT SMALL SCALE</small>	 <b>CONSTRUCTIONAL WOODWORK</b>

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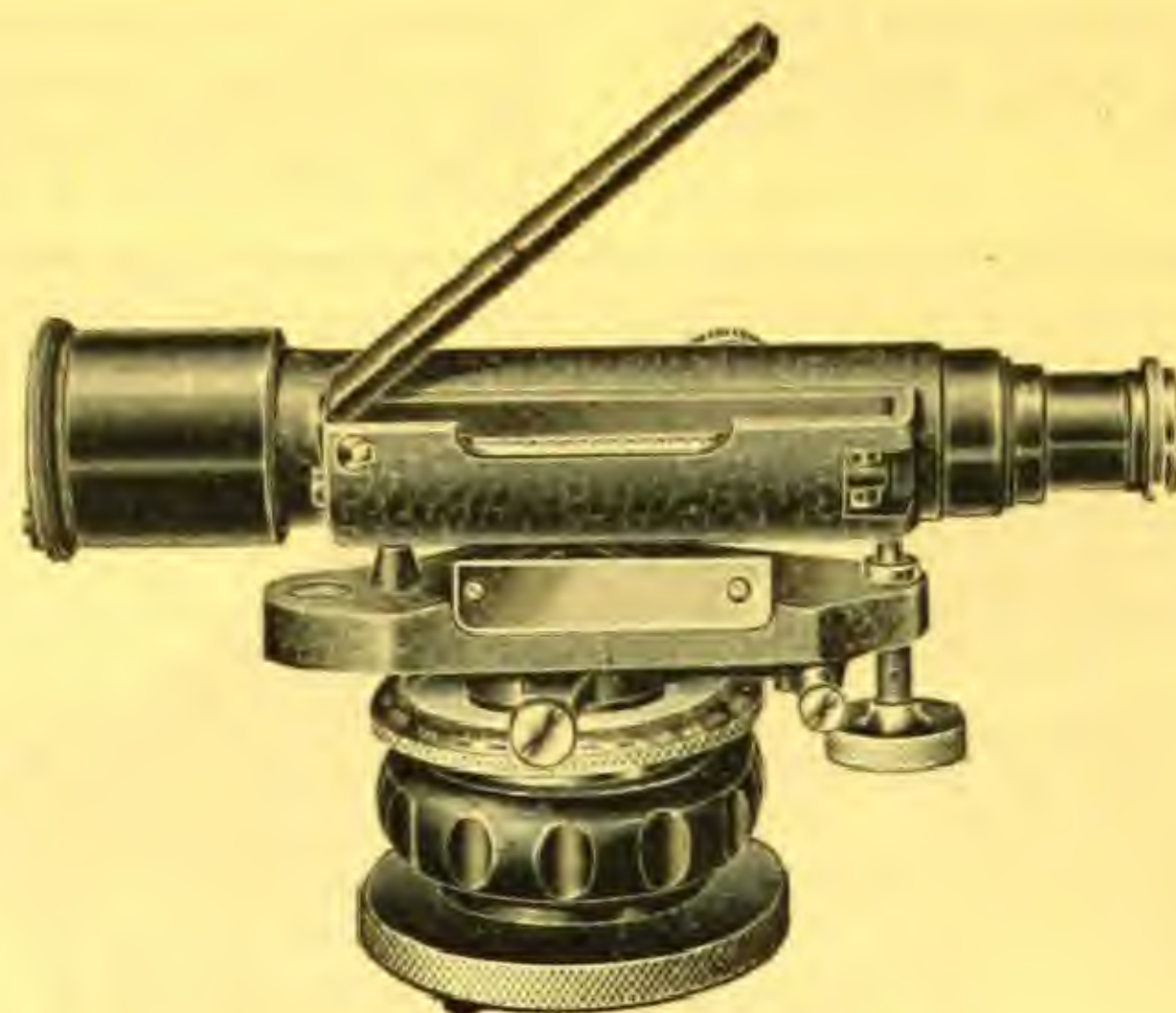
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N. H. Seward Pty. Ltd., who act as Melbourne agent for E. R. Watts, London, makers of high-class surveying and engineering instruments, carry a large representative stock of their instruments, amongst which the Quick-set level predominates for architectural work.

Modern levels are now obtainable, so constructed that the telescope is no longer attached rigidly to the vertical axis of the instrument, but is fixed in such a way that it can be tilted by means of a slow-motion screw till it is brought truly horizontal as indicated by the bubble. This is a much more accurate method of levelling, as the bubble is viewed from the eye-end of the telescope and the observation is made at the moment of reading the staff. The Quick-set Level incorporates this feature with a quick-setting ball-base, which quickly levels the instrument approximately.

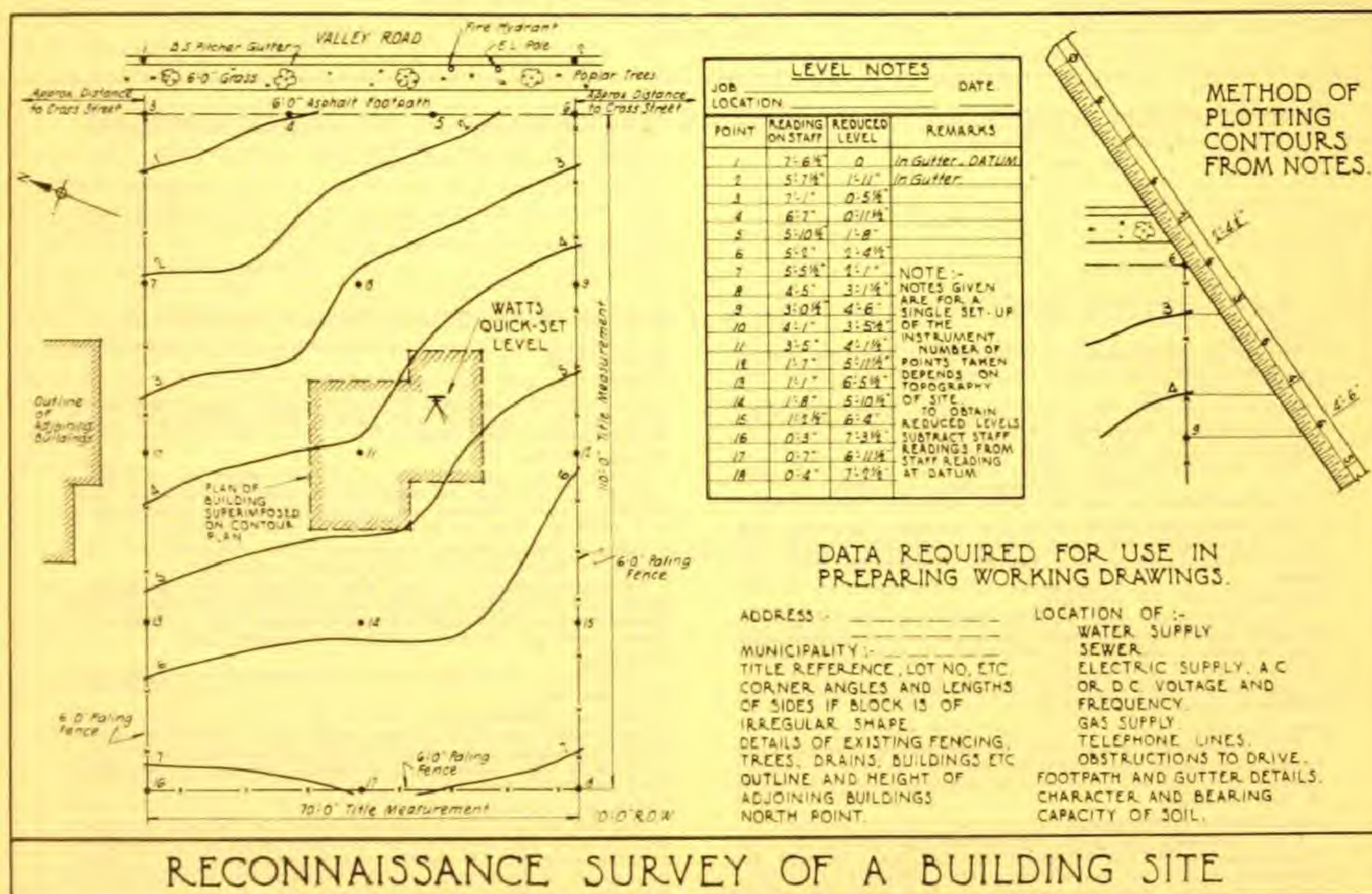


WATTS QUICK-SET LEVEL.

The Ideal Instrument for the Architect and Engineer.

Other features are: A telescope that reads .01 of a foot at 300 ft.; a graduated circle divided to degrees for laying out angles; and an extreme portability — the instrument, case and tripod weighing only 11½ lbs.; this combined with a threefold 9 ft. levelling staff is easily carried by one man.

Bearing in mind that the cost of personnel is the most expensive item in most surveying operations, it is obviously sound economy to use the most suitable instruments, and for such work as the Reconnaissance Survey the Quick-set is the instrument for the job. N. H. Seward Pty. Ltd. also have stocks of measuring bands, levelling staves, and other equipment, and will be pleased to send descriptive literature. Their representative will be pleased to demonstrate the Quick-set at any time.



(The drawing on this page was produced by the Architectural Staff of Ramsay's Catalogue)



# WHELAN THE WRECKER

(JAMES WHELAN)

SYDNEY ROAD, COBURG

SYDNEY ROAD, BRUNSWICK

MELBOURNE

S.A.A. File No.

Phone: Brunswick 225.

Phone: Brunswick 215.



Whelan the Wrecker is Here

The removal of old buildings in the congested portions of the city, and even elsewhere, is usually entrusted to firms who are experienced specialists as wreckers, rather than to building contractors.

Whelan the Wrecker, who has specialised in all classes of wrecking operations during the past forty years, is fully competent to undertake large or small demolishing work presenting difficult or unusual features. Some of the largest of Melbourne's oldest structures, being in a precarious condition at the time of demolition, have been—without loss of a single life or limb—successfully and rapidly demolished to make way for buildings of a more modern design.

Careful study of wrecking and cleaning up costs and accurate estimating of the existing materials which may be salvaged, enables Whelan the Wrecker to submit a definite and competitive quotation on any wreckage job.

Sometimes it is permissible to reuse portion of materials of the existing building in the new structure on the same site. A thorough knowledge by the Wrecker of the value of these materials is then essential, as he may be able to place before the architect such information which may effect a substantial economy in cost to the owner.

## Building Materials Available

Owing to the careful salvaging of his wrecking gangs and to his transportation and yarding facilities, Whelan the Wrecker has available, in his two big yards in Sydney Road, a quantity of sound second hand building materials suitable for reuse in new work where economy is of importance. These materials, covering a full range of carefully-cleaned bricks, structural steel, galvanised iron, timber, tiles, etc., are all in good condition and are available at reasonable rates.



An Outstanding Example of Difficult Demolition Work carried out by Whelan The Wrecker—The Gas Retort House (100 ft. x 300 ft. long) at West Melbourne Gas Works.

## SHORT FORM WRECKING CONTRACT AS RECOMMENDED BY JAMES WHELAN

I agree to demolish and remove the existing structure belonging to \_\_\_\_\_ and situated at \_\_\_\_\_ for the sum of £ \_\_\_\_\_ according to the conditions of the attached specification and under your supervision.

Accepted by \_\_\_\_\_

(Signed) James Whelan.

## ARCHITECT'S SPECIFICATION FOR A TYPICAL WRECKING SUB-CONTRACT

### GENERAL.

The whole of the work in this contract shall be carried out under the supervision of the architect and to his entire satisfaction.

Payment shall be made on completion under a certificate in writing signed by the architect.

### REGULATIONS, FEES AND PERMITS.

The Demolisher shall give notice in writing to the \_\_\_\_\_ before commencing any work.

\*The City Council or other body having jurisdiction over the work.

The Demolisher shall secure all necessary permits and pay all necessary fees and comply with all by-laws and regulations of authorities having jurisdiction over the work.

Note.—If the above forms part of the General Contractor's work, modify the paragraph accordingly.

### INSURANCE.

The Demolisher shall carry all necessary insurance to render the owner free from all damage or loss to workmen or to the public that may be occasioned by the work of this contract.

### FOOTPATH CROSSING.

The footpath crossing fee shall be paid by the Demolisher and, on evidence of payment, it will be refunded to him by the Owner. The design of the footpath crossing shall be subject to the approval of the

When the existing building has some salvage value the following is recommended:—

I agree to pay the Owner the sum of £ \_\_\_\_\_ and demolish and remove the existing structure belonging to \_\_\_\_\_ and situated at \_\_\_\_\_ according to the conditions of the attached specifications and under your supervision.

Accepted by \_\_\_\_\_

Architect

(Signed) James Whelan.

Date \_\_\_\_\_

Architect as well as in conformity with all Municipal Regulations.

### CONTENTS OF THE BUILDING.

Such articles as ladders or any other loose furniture shall not be considered any part of the building and may be removed by the Owner.

### DEMOLITION.

The present building upon the site shall be removed entirely to the top of existing foundation. All the old material shall become the property of the Demolisher and shall be removed by him from the premises.

Note.—If certain materials or parts of the structure are to be salvaged or reused, modify the above paragraph accordingly.

The Demolisher will note that certain walls are party walls and that the interests and rights of the adjoining Owner/s must be observed. No damage shall be done to these walls by careless cutting or tearing out.

### DEBRIS.

All debris and rubbish shall be cleaned up and removed from the site.

### SEALING SERVICES.

Any water, gas, or sewer pipes, and electrical cable shall, if necessary, be disconnected and sealed in accordance with the rules of any bodies having jurisdiction over these services.

### TIME OF COMPLETION.

A limit of \_\_\_\_\_ weeks shall be allowed for the demolishing and clearing of the site and the completion of this contract. A penalty not exceeding \_\_\_\_\_ per day shall be enforced at the Architect's discretion, if time of completion exceeds this limit.





## STANDARDS ASSOCIATION OF AUSTRALIA

ESTABLISHED UNDER THE AEGIS OF THE COMMONWEALTH AND STATE GOVERNMENTS FOR THE PROMOTION OF STANDARDISATION AND SIMPLIFIED PRACTICE

SYDNEY (Headquarters): Science House, Gloucester and Essex Streets.

MELBOURNE: Kelvin Hall, Collins Place.

BRISBANE: Empire Chambers, cnr. Queen and Wharf Streets.

ADELAIDE: Alliance Building, Grenfell St.

PERTH: Chief Mechanical Engineer's Office, W. Aust. Government Railways, Midland Junction.

HOBART: Hydro-Electric Department.

NEWCASTLE: Howard Smith Chambers, Watt Street.

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S.A.A. File No.

### Simplified Practice

The word "Standardisation" is generally very loosely used to describe a broad field of activity, ranging all the way from work of a scientific nature to many simple commercial methods.

It has been said: "Standardisation is a positive approach to a problem, its function being the determination and establishment of design, materials and performance. Simplification is a negative approach, its function being to select from existing standards those which are of the greatest importance, and concentrate on the production of these."

In other words, Standardisation is creative, while Simplification is selective. The Simplified Practice Division has adopted a slogan to describe its operations in that "Simplified Practice is the concentration upon sizes, types and varieties in greatest demand."

### The Objects and Benefits of Simplified Practice

Simplification, as already pointed out, is a method of reducing waste by elimination of unnecessary variety in Australian products. More especially it is the concerted action on the part of producers, distributors and consumers, with the co-operation of the Simplified Practice Division of the Standards Association of Australia, to reduce capital charges, stocks, storage space, and similar overhead costs, and to increase sales turnover and specialised production, distribution, and thus employment. The application of a Simplified Practice programme should not in any way hamper individuality in design. During the war period the whole of the belligerent nations developed national Simplified Practice schemes, but with the passing of the war emergency conditions were discarded and in many instances rapid returns were made to the uneconomic conditions of over-variety existing in pre-war days.

### A National Clearing House

Industry seems entirely to have lost sight of the advantages of Simplified Practice, and it now becomes the duty and policy of the S.A.A. through its Division of Simplified Practice to aim for the gradual introduction of Simplified Practice programmes, national in scope, that will tend to bring about economies that are to-day, more than ever, essential.

The Division of Simplified Practice in its activities as a "national clearing house" affords a neutral agency through which producers, distributors and consumers can meet on common ground and conduct conferences and develop recommendations which will be of interest and value to all concerned and, in the aggregate, of national value.

### Development of a Recommendation

In every instance a simplification programme must originate within the industry concerned. The help rendered by the Simplified Practice Division is in the preliminary collection and analysis of statistics, in securing the general adoption of and in assisting to sustain adherence to the published recommendations, and this would be impossible on a national scale without the machinery established by the Association.

Since this important measure for national waste elimination is beneficial in proportion to the degree in which recommendations are observed, the main point is to secure the participation of all interests. Interests which do not participate in a Simplified Practice programme not only deprive themselves of the economies and increased efficiency inherent in Simplification, but prevent the industry as a whole and its customers from securing the full measure of the benefits.

### ADVANTAGES OF SIMPLIFIED PRACTICE

Some of the specific advantages which follow the adoption of a national Simplified Practice scheme are:

#### To the Producer—

- 1—Less capital tied up in slow-selling stocks.
- 2—More economical manufacture due to less idle manufacturing equipment, longer runs with fewer changes, less stock to handle, reduced overhead charges.
- 3—More permanent employment.
- 4—Larger production units and less special machinery.
- 5—Expedition delivery.
- 6—Limited error in shipments.

#### To the Wholesaler and Retailer—

- 1—Increased sales turnover.
- 2—Elimination of slow-selling stocks.
- 3—Stabilised lines.
- 4—Greater concentration of sales efforts on fewer items.
- 5—Decreased capital invested in stocks of repair parts.
- 6—Less storage space required.
- 7—Decreased general overhead.

#### To the Consumer—

- 1—Better value than otherwise possible.
- 2—Better service in delivery and repairs.
- 3—Better quality of product.

(Continued on next page)



## AUSTRALIAN STANDARD SPECIFICATIONS

PUBLISHED BY THE ASSOCIATION

## CIVIL ENGINEERING

Publication No.

- A. 1—1928.—Structural Steel and Rolled Steel Sections for Structural Purposes.  
A. 2—1926.—Portland Cement.  
A. 3 and 4—1928. T.—Quicklime and Hydrated Lime.

## MECHANICAL ENGINEERING

Publication No.

- B. 1—1928. T.—Brass Water Fittings (Stop, Bib, Pillar, Globe and Ferrule or Main Taps).  
B. 2—1928. T.—Copper Tubes (Suitable for Screwed Connections and Compression Joints or Brazed Joints. For Pressures up to 200 lb. per Square Inch).  
B. 3—1928. T.—Rubber Conveyor and Power Transmission Belting.  
B. 4—1929. T.—Vegetable Tanned Leather Belting.

## ELECTRICAL ENGINEERING

Publication No.

- C. 1—1926. T.—Electrical Voltages and Frequencies.  
C. 2—1925. T.—Electrical Performance of Traction Motors.  
C. 3 to 11—1925. T.—Overhead Line Wire Material for Telegraph and Telephone Purposes.  
C. 12—1928.—Telephone Cable.  
C. 13—1925. T.—Switchboard Bus - Bars and Connections—Standard Marking.  
C. 17—1926. T.—Terms and Definitions Used in connection with Telegraphs and Telephones.  
C. 18—1926. T.—Bare Annealed Copper Wire for Electrical Machinery and Apparatus.  
C. 19—1926. T.—Slate Slabs for Electrical Purposes.  
C. 20—1926. T.—Moulded Flat Top Insulating Bushes.  
C. 21—1928.—Enamelled Plain Copper Wire for Electrical Instruments and Apparatus.  
C. 22—1926. T.—Water-tight Glands for Electric Cables.  
C. 23—1926. T.—Air-Break Knife Switches and Laminated Brush Switches.  
C. 24—1926. T.—Air-Break Circuit Breakers.  
C. 25—1926. T.—Flame-Proof Air-Break Switches.  
C. 26—1926. T.—Flame-Proof Air-Break Circuit Breakers.  
C. 27—1926. T.—Totally Enclosed Air-Break Circuit Breakers.

Publication No.

- C. 28—1926. T.—Totally Enclosed Air-Break Switches.  
C. 29—1926. T.—Metallic Resistance Materials for Electrical Purposes.  
C. 30—1926. T.—Drum Controllers and Resistances for Use Therewith for Electric Motors.  
C. 31—1926. T.—Face Plate Controllers and Resistances for Use Therewith for Electric Motors.  
C. 32—1926. T.—Contactor Controllers and Resistances for Use Therewith for Electric Motors.  
C. 33—1926. T.—Drum Starters for Electric Motors.  
C. 34—1927. T.—Electrical Performance of Industrial Electric Motors and Generators.  
C. 35—1927. T.—Electrical Performance of Large Electric Generators and Motors.  
C. 36—1927. T.—Electrical Performance of Large Electric Generators and Motors.  
C. 37—1926. T.—Steam Turbines for Electrical Plant.  
C. 38—1927. T.—Electrical Performance of Alternators of the Steam Turbine Driven Type.  
C. 39—1927. T.—Electricity Meters.  
C. 40—1927. T.—Pressboard for Electrical Purposes.  
C. 41—1927. T.—Hard-Drawn Copper Stranded Circular Conductors for Overhead Power Transmission Purposes.  
C. 42—1927. T.—Indicating Ammeters, Voltmeters, Wattmeters, Frequency and Power-Factor Meters.  
C. 43—1927. T.—Parallel Sided Carbon Brushes.  
C. 45—1928. T.—Instrument Transformers.  
C. 46—1927. T.—Liquid Starters for Electric Motors.  
C. 47—1927. T.—Star-Delta Switch Starters for Electric Motors.  
C. 48—1927. T.—Multiple Switch Starters for Electric Motors (D.C.).  
C. 49—1927. T.—Contactor Starters for Electric Motors.  
C. 50—1928. T.—Insulated Annealed Copper Conductors for Electric Power and Light (including Voltage Tests).  
C. 51—1928. T.—Vulcanised Fibre for Electrical Purposes.  
C. 52—1928. T.—Bus-Bars and Connections. Constructed of Bare Copper or Aluminium.  
C. 53—1928. T.—Fixed Condensers for Radio Purposes.  
C. 54—1928. T.—Graphic (Recording or Chart-Recording) Ammeters, Voltmeters and Wattmeters.  
C. 55—1928. T.—5-Ampere Two-Pin Wall Plugs and Sockets for Domestic Purposes.  
C. 56—1929. T.—Electric Cable Soldering Sockets.

## TRANSPORTATION

Publication No.

- E. 2 to 5—1925. T.—Railway Rolling Stock Material: Springs and Spring Steel.  
E. 6 and 7—1925. T.—Railway Rolling Stock Material: Steel Plates, Angles, etc., and Rivets, Steel Castings.  
E. 8 to 12—1925. T.—Railway Rolling Stock Material: Copper Plates, Tubes and Pipes, and Brass Tubes.  
E. 12—Seamless Copper Pipes for Locomotive Boilers.  
E. 13 to 15—1927. T.—Railway Rolling Stock Material: Locomotive Tyres, Carriage, Waggon and Tender Tyres, Weldless Steel Angle Rings.  
E. 16 to 21—1927. T.—Railway Rolling Stock Material.  
E. 22 to 29—1928.—Railway Permanent Way Material: Steel Rails, Fishplates, Fishbolts, Spring Washers, Dogspikes and Sleeper-Plates.

## CHEMICAL INDUSTRY

Publication No.

- K. 1—1926.—Sampling and Analysis of Plain Steels, Alloy Steels and Pig Iron.  
K. 2 to 6—1926.—Linseed Oil.  
K. 7 and 8—1926. T.—Turpentine.  
K. 9 and 10—1926.—White Lead.  
K. 11—1929.—China Wood Oil (Tung Oil).  
K. 12 and 13—1929.—Perilla Oil and Soya Bean Oil.  
K. 14 to 16—1929.—Varnishes.  
K. 17 and 18—1929.—Zinc Oxide.  
K. 19—1929.—Genuine Red Lead, Dry.  
K. 20—1929.—Lithopone.  
K. 21 to 26—1927. T.—Inert Fillers.  
K. 27—1929.—Linseed Oil Putty.  
K. 30.—Special Industrial Alcohol.  
K. 31.—Butyl Alcohol.  
K. 32 to 34—1928. T.—Ethyl Acetate, Butyl Acetate and Amyl Acetate.  
K. 35 to 37—1928. T.—Acetone, Methyl, Acetone and Methyl Ethyl Ketone.  
K. 38—1928. T.—Orange Shellac.  
K. 39—1928. T.—Grass Tree Resin.  
K. 40—1929. T.—Ready Mixed Linseed Oil Paint, Red Oxide of Iron.

## SAFETY CODES

Publication No.

- CK. 1—1929.—Safety Code for the Use of Paints.  
CB. 1—1930.—Boiler Code.

## REPORTS

- No. PS. 1—1927.—Power Alcohol as a Potential Source of Power within the Commonwealth of Australia.  
No. PS. 2—1928.—Progress in the Development of Combustion of Victorian Brown Coal.  
No. PS. 3—1929.—The Coal Resources of Australia; prepared by the Power Survey Sectional Committee.

## PROJECTS NOW UNDER SURVEY:

Specifications of particular interest are in hand for:—

Tests for Concrete.  
Concrete Lintels.  
Roofing Tiles.  
Partition Tiles.  
Firebricks.  
Cast Stone.  
Dammar Resin.  
White Lead.

Zinc Oxide.  
Reinforced Concrete Pipes.  
Glazed-ware Pipes.  
Flushing Cisterns and Pans.  
Syphonic Suites.  
Road Making Materials:—Bitumen, Setts, Stones and Aggregates.

Regulations for:—

Steel-Frame Buildings.  
Reinforced Concrete Structures.  
Lifts.

Cranes and Hoists.  
Welding.

Simplified Practice Recommendations for: Sheet Metal Guttering, Ridging and Downpiping.

Plywood Panels for Doors.  
Road Gully-Gratings.  
Shovel Sizes.  
Bank Cheques and Drafts.  
Commercial Paper Sizes.  
General Conditions of Contract.

*For National Reasons, Australian Architects should specify*

**"AUSTRALIAN STANDARDS"**

*and assist the elimination of Waste by supporting*

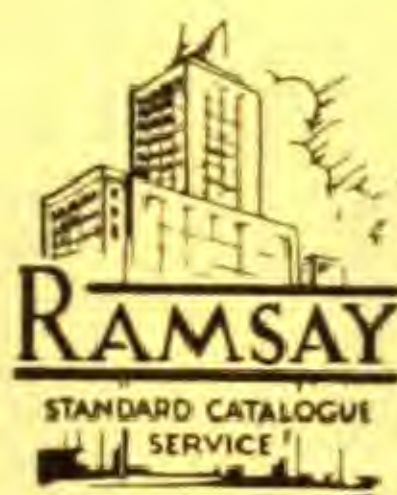
**"AUSTRALIAN SIMPLIFIED PRACTICE RECOMMENDATIONS"**



## SECTION B

[Containing S.A.A. Filing Sections Nos. 3, 4, 5, 6, 7, 8, 9 and 10]

## MASONRY MATERIALS





# THE AUSTRALIAN CEMENT MANUFACTURERS' ASSOCIATION

HEAD OFFICE:  
YORKSHIRE HOUSE,  
14 SPRING STREET, SYDNEY.

BRANCH OFFICE:  
TEMPLE COURT,  
COLLINS STREET, MELBOURNE.

A.  
C.  
M.  
A.

## What the Association Is

The Australian Cement Manufacturers' Association is the service organisation of the Portland Cement Manufacturers of Australia.

The manufacture of Portland Cement is an extremely intricate process necessitating highly technical control and the resultant product has such versatility and performs its function as a cementing medium of inert aggregates so easily and so well that considerable laxity in its use has become increasingly evident. Additionally, the increase and variety of products that can be economically manufactured with Portland Cement are not sufficiently realised.

The Australian Cement Manufacturers' Association has been formed to disseminate accurate information relating to the correct use of Portland Cement in its many and varied phases and to further its use in the important though lesser known uses. The organisation is in continuous touch with all the latest developments in the use of cement throughout the world and this information is obtainable from the offices of the Association direct or from any of the Cement Companies of Australia.

To assist in the dissemination of the proper uses of cement in its many phases and to show some of its wide variety of uses, a number of publications are issued free to enquirers. The publications listed below are at present available and are being continuously added to.

A staff of qualified engineers and chemists are always available to assist you in any phase of construction requiring the use of cement and merely await your enquiry. Information is free.

## Publications

Method of making concrete.  
Concrete fence posts.  
Concrete footpaths and floors.  
Concrete walls and steps.  
Concrete troughs, tanks and wells.  
Concrete blocks, bricks and slabs.  
Concrete roofing tiles.  
Concrete for farm and station.  
Portland Cement Stucco.

Portland Cement Plaster.  
Portland Cement Textures.  
Concrete round the home.  
Concrete silos.  
Influence of the water cement ratio on the strength of concrete.  
Data for Engineers and Architects.  
Inspectors' Manual.  
Primer.

## FACTORS IN MAKING GOOD CONCRETE

### Observance of the Water Cement Ratio Law

This law was evolved by Professor Duff Abrams, of the Lewis Institute, Chicago, who, as a result of some thousands of experiments, found that the strength of concrete was controlled by the relative proportions of water and cement, other factors being equal.

EFFECT OF QUANTITY OF MIXING WATER ON THE COMPRESSIVE STRENGTH OF CONCRETE.

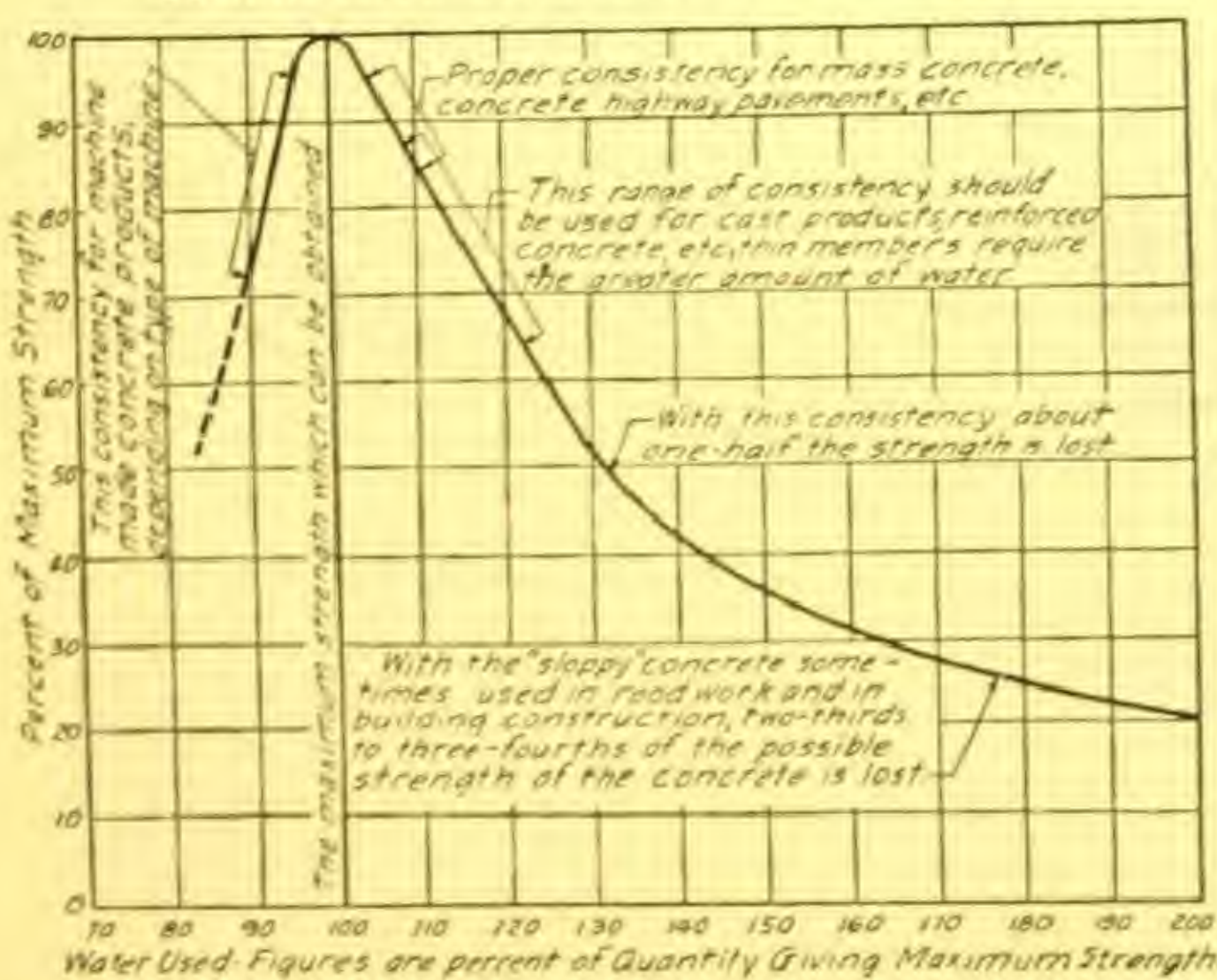


Fig. 1.—Note: In general construction, the maximum strength can rarely be obtained, but it is possible to obtain 70 to 90 per cent. of the maximum strength without additional expense by restricting the quantity of mixing water.

This law applies within the limits of workability in the mix, and the effect of excess mixing water is clearly shown in Fig. 1.

The use of about 2½ gallons of water per bag of cement (94 lbs.) makes a paste that can be stiffly moulded. Water in excess of this amount renders the mix more plastic, but has the effect of diluting

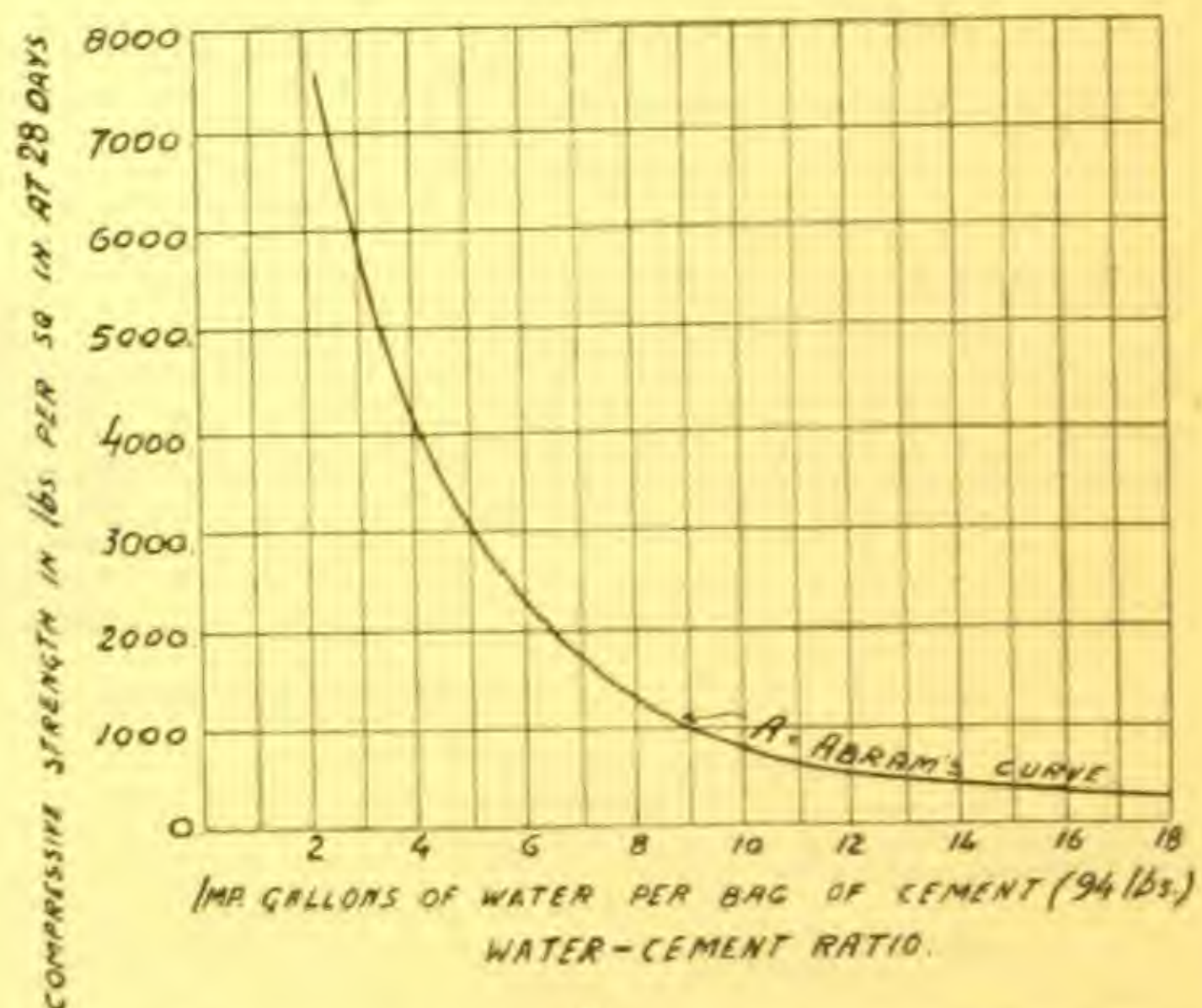


Fig. 2.—Relation between compressive strength of concrete and its water content showing results of Abrams' tests on a large number of mixes ranging from 1—15 to neat cement. Data taken from Bulletin 1, Structural Materials Research Laboratory, Chicago, Illinois.

the paste and reducing the potential strength, as will be readily seen in Fig. 2.

Because of variations in the moisture content, absorption and grading of the aggregate, the exact

(Continued on next page)



amount of water that will be required for a given mixture and given consistency cannot usually be specified in advance. However, approximate quantities applicable to usual conditions are given in the following table.

APPROXIMATE QUANTITY OF MIXING WATER  
REQUIRED FOR CONCRETE.

Mix		Approximate Mix as Usually Expressed			Water Required (Imperial Gallons per bag of Cement)	
Cement	Volume of Aggregate After Mixing	Cement	Aggregate		Minimum	Maximum
			Fine	Coarse		
1	3	1	1½	2½	4½	4½
1	4	1	1½	3	4½	5
1	4½	1	2	3	4½	5½
1	5	1	2	4	5	5½
1	6½	1	2½	5	6	6½
1	7½	1	3	6	6½	7½

### Consistency

Consistency is a general term relating to the character of the mix with respect to its state of fluidity. Consistency embraces the entire range of fluidity from the driest to the wettest possible mixtures, and requires a qualifying term for definition.

The term "plastic" is used to describe a consistency of freshly-mixed concrete, which can be readily moulded, but which changes form slowly when the mould is removed. A mass that is plastic does not crumble. It flows sluggishly and without segregation.

The term "workability" is used with reference to concrete mixtures to describe the ease or difficulty which may be encountered in placing the concrete in a particular location. It involves not only the thought of a consistency of concrete, but also the condition under which it is to be placed—size and shape of the member, spacing of the reinforcement rods, or

other details interfering with the ready filling of the forms. A stiff plastic mixture, with large aggregate, which is workable in a large open form, would not be workable, for example, in a thin wall of complicated reinforcing details.

The consistency of a concrete mix is easily measured and regulated by what is known as the slump test. By using this test on the job, the quantity of mixing water used in the concrete can be controlled fairly closely. The only apparatus needed to effect the slump test is a metal sheet form shaped like the frustum of a cone 4 in. in diameter at the top and 8 in. at the bottom and 12 in. high. A metal rod of ½ in. diameter and 21 in. long is also required. This equipment can be made at a small cost by any tinsmith.

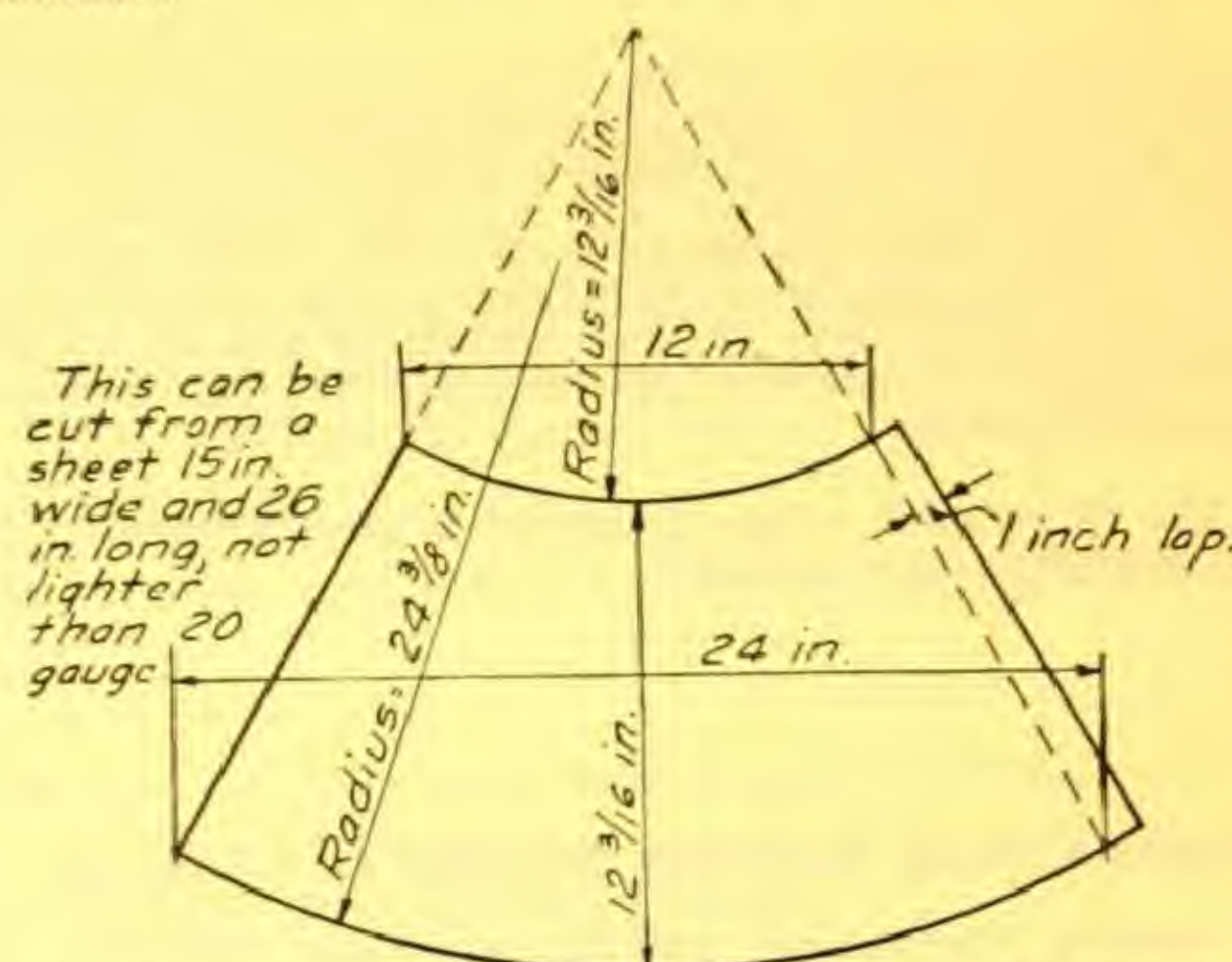


Fig. 3.—Diagram for cutting metal to make the frustum of a cone used for the slump test.

The concrete to be tested is placed in the metal sheet form in layers about 4 in. deep. Each layer is worked with the pointed metal rod until the cone is filled and struck off level. In order to secure uniform results, each layer should be rodded exactly 25 times. The cone form should then be lifted off immediately, and the mass allowed to settle until quiescent and the settlement or slump measured.



Fig. 4.—The slump test. Filling the slump cone.



Measuring the slump.

(Continued on next page)





Fig. 5.—DIAGRAM SHOWING TYPICAL RELATIVITY BETWEEN CONSISTENCY AND SLUMP.  
The tags on each pile indicate the relative consistency of each pile. The scale at the side shows the slump in inches.

Concrete having a slump of  $\frac{1}{2}$  in. to 1 in. will contain only a little more water than necessary for maximum strength, but will be too stiff for most construction work. Such concrete is said to have a relative consistency of 1.00. Concrete containing 10 per cent. more water is said to have a relative consistency of 1.10, and will give a slump test of three to four inches; 50 per cent. more water gives a relative consistency of 1.50, with a slump of 8 to 10 inches.

The illustration shows a typical relation between relative consistency and slump.

The following maximum slumps are recommended:—

Types of Concrete	Maximum Slump
Mass concrete . . . . .	2 inches
Reinforced concrete—	
Thin vertical sections . . . . .	6 inches
Heavy sections . . . . .	2 inches
Thin confined horizontal sections . . . . .	8 inches
Roads and pavements—	
Hand finished . . . . .	4 inches
Machine finished . . . . .	1 inch
Mortar for floor finish . . . . .	2 inches

### Proper Curing Increases Strength of Concrete

Careful distinction should be made between the requirements of concrete for water during the mixing operation and in curing. A safe rule to follow is to use the smallest quantity of mixing water that will produce a sufficiently plastic mixture for the work in hand, and then to give the surface of the concrete as much curing water as possible after the concrete is placed.

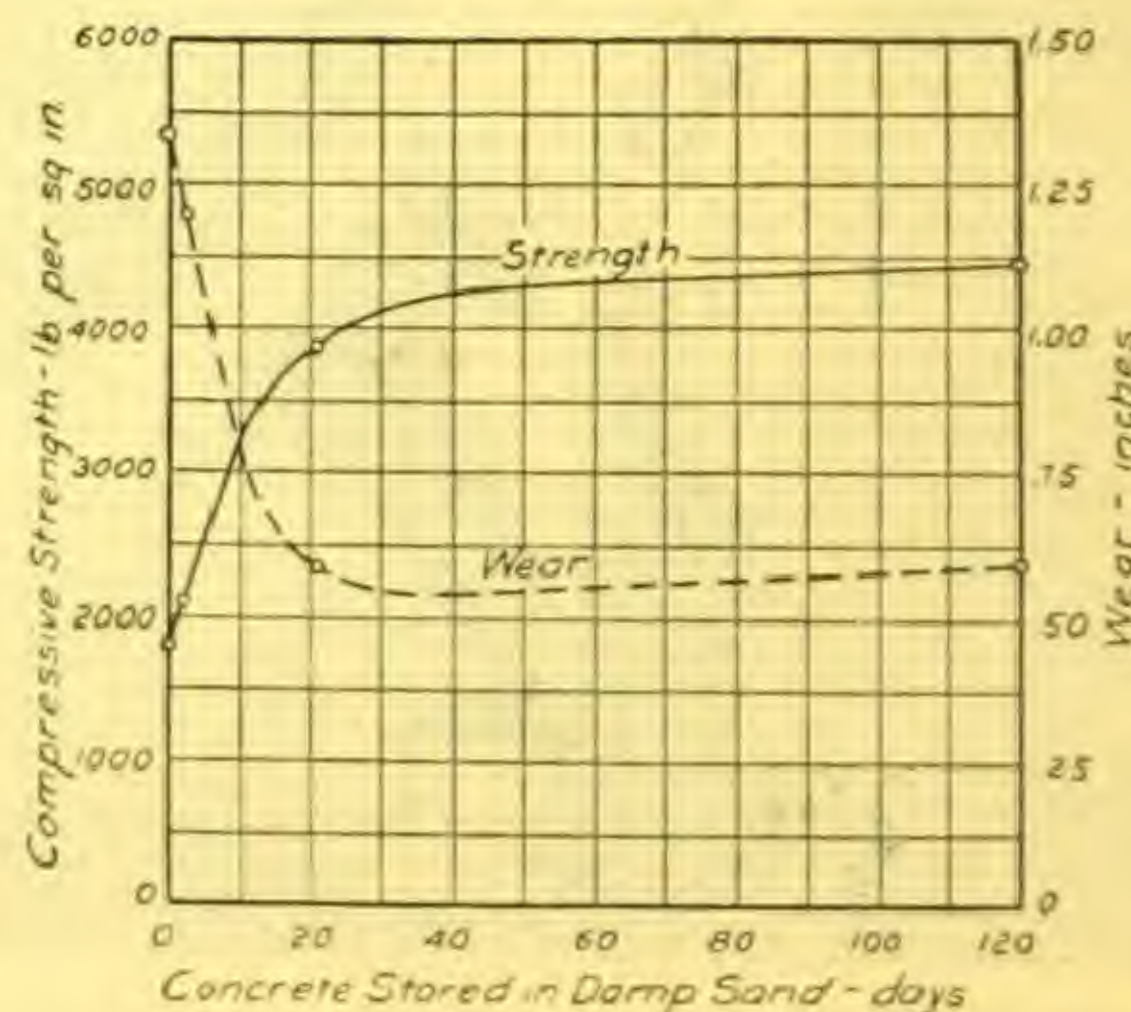
Concrete hardens because of the chemical reactions between Portland cement and water. Down to an amount less than can be used in construction work, the smaller the quantity of mixing water, the stronger will be the concrete. Therefore, the quantity of mixing water should be reduced as far as possible. However, once the concrete is placed, and it has hardened, conditions change, and ample curing water should be provided.

The chemical reactions of the hardening of concrete are slow, and if sufficient water is not present, they cannot be completed. The mixing water essential to proper hardening of freshly placed concrete is often lost by absorption or evaporation even after the concrete has begun to harden. Under such conditions, concrete attains only part of its potential strength. Therefore, the water content of freshly-placed concrete should be conserved.

Keeping concrete damp during its early hardening period, or, in other words, providing plenty of curing water, prevents evaporation of necessary moisture and permits concrete to harden under favourable conditions.

### Protect Concrete While Hardening

Tests show that protection during the early hardening period greatly increases the strength and resistance to wear of concrete. The diagram gives a summary of the results of these tests. All specimens were tested at the same age—four months. One set was allowed to harden in air for the full four months, the second was stored in damp sand for three days, and in air for the remaining 117 days; the third set was stored in damp sand for 21 days and in the air the remaining 99 days; while the fourth set was stored in damp sand for the full 120 days, and was tested while still damp.



(Continued on next page)



Thus the increased strength and resistance to wear was caused solely by the better curing conditions provided.

Note that keeping concrete damp for the first ten days increased its compressive strength 75 per cent., for three weeks 115 per cent., and for four months 145 per cent. of the air-cured sample.

Note also that keeping concrete damp for the first ten days decreased the amount of wear 40 per cent., and for three weeks 55 per cent. Keeping concrete damp for four months did not cause a further decrease in wear, but the specimens were tested damp. Had they been allowed to dry out for a few days before being tested, the amount of wear would probably have been less.

Reversing the form of these wear results, ten days' protection increased the resistance to wear of concrete 65 per cent., and three weeks' protection 120 per cent. Thus proper curing increases the resistance to wear almost in the same proportion as the compressive strength.

Needless to say, resistance to wear is an important consideration in floors, pavements and platforms.

### Methods of Protection

Freshly-placed concrete can be kept damp in several ways. Drenching the sub-base and forms with water before concrete is placed will reduce absorption. Horizontal surfaces, such as floors and pavements, can be covered with damp sand the day after they are laid, when they have hardened sufficiently to prevent pitting the surface, and kept damp by frequent sprinkling. Sometimes small dykes of clay are built around a section of floor or pavement, which is then flooded with water. Vertical surfaces can be kept damp by frequent sprinkling of the forms or exposed concrete. Sometimes walls are covered with canvas or hessian, which is drenched with water several times a day.

Keeping concrete damp the first ten days will give the owner over 65 per cent. better value for his money. Three weeks' protection will give still greater increase in value. There is nothing that can be done to concrete that will pay such big dividends in better concrete as proper use of water in mixing and in curing.

Remember, less water in mixing—more water in curing.

## SPECIFICATION FOR CONCRETE FLOOR CONSTRUCTION

### MATERIALS

#### A.—PORTLAND CEMENT

1. Portland Cement shall meet the requirements of the current Standard Specifications for Portland Cement adopted by the Standards Association of Australia.

#### B.—FINE AGGREGATE

##### General Requirements—

2. Fine aggregate shall consist of natural sand or screenings from hard, tough, crushed rock or gravel consisting of quartz grains or other hard material, clean and free from any surface film or coating and graded from fine to coarse, with the coarse particles predominating.

##### Grading—

3. Fine aggregate, when dry, shall pass a screen having four (4) meshes to the linear inch; not more than twenty-five (25) per cent. shall pass a sieve having fifty (50) meshes per linear inch, and not more than five (5) per cent. shall pass a sieve having one hundred (100) meshes per linear inch.

##### Impurities—

4. Fine aggregate shall not contain injurious vegetable or other organic matter as determined by the colorimetric test nor more than five (5) per cent. by volume of clay or loam. Field tests may be made by the architect or engineer on fine aggregate as delivered at any time during the progress of the work. If there is more than seven (7) per cent. of clay or loam by volume in one hour's settlement after shaking in one hundred (100) per cent. excess of water, the material represented by the sample shall be rejected.

#### C.—COARSE AGGREGATE

##### Coarse Aggregate—

5. Coarse aggregate shall consist of clean, hard, tough, crushed rock or pebbles graded in size, free from vegetable or other organic matter, and shall contain no soft, flat or elongated particles. The size of the coarse aggregate shall range from one and one-half (1½) inches down,

not more than five (5) per cent. passing a screen having four (4) meshes per linear inch, and no intermediate sizes shall be removed.

#### No. 1 Aggregate—

6. No. 1 aggregate for the wearing course shall consist of clean, hard, tough, crushed rock or pebbles, free from vegetable or other organic matter, and shall contain no soft, flat or elongated particles. It shall pass, when dry, a screen having three-eighths (¾) inch openings and not more than ten (10) per cent. shall pass a screen having four (4) meshes per linear inch.

#### D.—WATER

7. Water shall be clean, free from oil, acid, alkali or vegetable matter.

#### E.—COLOUR

##### General Requirements—

8. If artificial colouring matter is required, only those mineral colours shall be used which, in the amount hereinafter specified, will not appreciably impair the strength of the cement.

#### F.—REINFORCEMENT

##### General Requirements—

9. The reinforcing metal shall meet the requirements of the current Standard Specifications of Steel Reinforcement of the Standards Association of Australia. It shall be free from excessive rust, scale, paint or coatings of any character which will tend to reduce or destroy the bond.

#### G.—JOINT FILLER

10. The joint filler shall be a suitable compound that will not become soft and run out in hot weather, nor hard and brittle and chip out in cold weather; or, prepared strips of fibre matrix and bitumen as approved by the architect or engineer. The strips shall be one-quarter (¼) inch in thickness and their width shall at least equal the full thickness of the slab.

(Continued on next page)



## SPECIFICATION FOR CONCRETE FLOOR CONSTRUCTION

(Continued)

## CONSTRUCTION

## A.—PROPORTIONING

11. The method of measuring the materials for the concrete or mortar, including water, shall be one which will ensure separate and uniform proportions of each of the materials at all times. A bag of Portland cement (94 lbs. net) shall be considered as one (1) cu. ft.

## B.—MIXING

## Machine Mixing—

12. All concrete shall be mixed by machine, except when the architect or engineer shall otherwise permit under special conditions. A batch mixer of an approved type shall be used. The ingredients of the concrete or mortar shall be mixed to the specified consistency, and the mixing shall continue for at least one (1) minute after all materials are in the drum. Raw materials shall not be permitted to enter the drum until all the material of the preceding batch has been discharged.

## Hand Mixing—

13. When it is necessary to mix by hand, the materials shall be mixed dry on a water-tight platform, until the mixture is of uniform colour, the required amount of water added, and the mixing continued until the mass is of uniform consistency and homogeneous.

## Retempering—

14. Retempering of mortar or concrete which has partially hardened, that is, mixing with or without additional materials or water, shall not be permitted.

## C.—CURING

## Covering—

15. As soon as the finished floor has hardened sufficiently to prevent damage thereby, the floor shall be covered with at least one (1) inch of wet sand, or two (2) inches of sawdust, which shall be kept wet by sprinkling with water for at least ten (10) days.

## Protection—

16. The freshly finished floor shall be protected from hot sun and drying winds until it can be sprinkled and covered as specified. The concrete surface must not be damaged or pitted by raindrops, and the contractor shall provide and use when necessary sufficient tarpaulins to completely cover all sections that have been placed within the preceding twelve (12) hours.

## REINFORCED CONCRETE FLOORS

## A.—FORMS

17. The forms shall be substantial, unyielding, and so constructed that the concrete will conform to the designed dimensions and contours, and shall also be tight to prevent the leakage of mortar. The supports for floors shall not be removed until the concrete has hardened sufficiently, and then only with the consent of the engineer or architect in charge. Permanent shores shall be placed in such manner as to assure safety of the floors after temporary supports are removed.

## B.—REINFORCEMENT

18. Reinforcing metal shall be provided as called for on the plans. It shall be placed as indicated and mechanically held in position so that it will not become disarranged during the placing of the concrete. Whenever it is necessary to splice tension reinforcement, the character of the splice shall be such as will develop its full strength. Splices at points of maximum stress shall be avoided. Splicing by lapping bars without contact with space between bars along the overlap equal to twice the thickness of the bars is preferable to mechanical splices or clamps.

## C.—CONCRETE SLAB

## Proportions—

19. The concrete shall be mixed in the proportions by volume of one (1) bag of Portland cement, two (2) cu. ft. of fine aggregate and four (4) cu. ft. of coarse aggregate.

## Consistency—

20. Only sufficient water shall be used to produce a workable plastic mix, which will flow sluggishly into the forms and around the reinforcement, and which can be conveyed from the mixer to the forms without the separation of the coarse aggregate from the mortar.

## Placing—

21. The concrete shall be placed in a manner to insure a smooth ceiling, and thoroughly worked around the reinforcement into the recesses of the form. Concrete shall be deposited in its final position as soon as possible after mixing. It shall be struck off to a surface at least one (1) inch below the established grade of the finished surface of the floor. Workmen shall not be permitted to walk in freshly laid concrete, and if sand or dust collects on the base, it shall be carefully removed before the wearing course is applied.

## Joints—

22. When it is necessary to make a joint in a floor slab, its location shall be designated by the architect or engineer; joints to be vertical.

## D.—WEARING COURSE

## Proportions and Thickness—

23. (Mixture No. 1)—The mortar shall be mixed in the proportions of one (1) bag of Portland cement, and two (2) cu. ft. of fine aggregate. The minimum thickness shall be three-quarters (¾) inch.

24. (Mixture No. 2)—The mortar shall be mixed in the proportions of one (1) bag of Portland cement, one (1) cu. ft. of fine aggregate, and one (1) cu. ft. of No. 1 aggregate for wearing course. The minimum thickness shall be three-quarters (¾) inch.

## Consistency—

25. The mortar shall be of the driest consistency possible to work with a sawing motion of the strike board.

## Placing—

26. The wearing course shall be placed immediately after mixing. It shall be deposited on the fresh concrete of the base before the latter is appreciably hardened and brought to the established grade with a strike-board.

Note.—When placing the wearing course after the concrete slab has hardened, eliminate paragraph 26 and substitute paragraphs 27 and 28.

## Preparation of Slab—

27. The surface of the slab shall be thoroughly roughened by picking or other means and cleaned of all dirt and debris.

## Placing—

28. The slab shall be thoroughly moist, but free from pools of water, when the grout and mortar for wearing course is placed. A neat cement grout shall be brushed on the surface of the slab, the wearing course immediately applied and brought to the established grade with a strike-board. Grout and mortar shall be used within forty-five (45) minutes after mixing with water.

## Finishing—

29. After the wearing course has been brought to the established grade by means of a strike-board, it shall be worked with a wood float in a manner which will thoroughly compact it and provide a surface free from depressions or irregularities of any kind. When required, the surface shall be steel trowelled, but excessive working shall be avoided.

## Colouring—

30. If artificial colouring is used, it must be incorporated with the entire wearing course and shall be mixed dry with the cement and aggregate until the mixture is of uniform colour. In no case shall the amount of colouring exceed twelve (12) per cent. of the weight of the cement.



### Heavy Duty Floors for Industrial Buildings

The attractive appearance of terazzo floors has long been recognised, but the use of this type of polished floor for industrial buildings is not so well appreciated.

The following is a description of the method of laying a heavy traffic floor. This floor was subjected to the action of heavily-loaded steel wheeled trucks, and the method of construction was adopted after tests of the wearing qualities of the floor under severe conditions.

The rough slab was first picked, swept and washed with clean water. One-inch round steel bars were then placed as levelling pegs and levelled up. The floor was again wet down, and a 1 to 1 cement sand grout brushed on. Before the grout had set a 1 to 2 mixture of cement and crushed rock uniformly graded from  $\frac{1}{4}$  in. to  $\frac{3}{4}$  in. was dumped on the floor and screened off. The mixture was as dry as it was possible to dump out of the mixer. The levelling pegs were then removed and the spaces filled with the 1 to 2 mixture.

Just about the time when the topping material was stiffening up, an even coating of  $\frac{1}{4}$  in. crushed rock was spread over the entire surface and rolled in with a 150-pound concrete roller. This roller was operated longitudinally and laterally until the entire area had been evenly rolled. A 900-pound roller was used next, and last of all, an 1800-pound roller was operated laterally, longitudinally and diagonally. This last rolling brought up some water and fine material to the surface.

As soon as possible after the final rolling, the floor was given a hand steel trowelling sufficient only to smooth out any of the stone that had been up-ended by the rolling process. Twelve men were able to trowel about 15,000 square feet of floor in two hours.

As a final operation the floor was ground with ordinary grinding machines, using carborundum block and coarse powdered emery, with a generous supply of water. The grinding operations were started from four to seven days after the topping had been placed.

After nineteen months of severe trucking, these floors are in excellent condition, and due to the smooth and even surface, the trucks do not produce the usual heavy rumbling. This type of construction also appears to hold great promise of solving the problem of floor construction in ice-cream factories, packing plants, etc., where the floors are subjected to the action of lactic, butyric or other weak acids in addition to truck traffic.

### Concrete Dance Floors

A satisfactory surface for dancing is usually obtained by giving an existing concrete floor one of the following simple treatments. However, a more perfect surface will be obtained by first grinding the floor with a floor-surfacing machine.

1. Liquid soap applied to a floor in the form of a lather and rubbed into the pores with a scrubbing brush, will, after repeating the process, produce a smooth, uniform surface. An occasional application of powdered soap to a floor thus treated will keep it in fairly good condition for dancing. If the floor is somewhat rough and porous, several coats of the soap treatment will be needed.

2. A mixture of paraffin wax and turpentine may be applied to the floor sufficient only to fill up the pores. An excess of the material would produce a sticky film. Both turpentine and paraffin wax should be of good grade, and no more paraffin used than will be completely dissolved in the turpentine.

After the turpentine has evaporated, that is, after the floor surface is dry, it should be treated with powdered wax in the same manner as for wooden dancing floors.

3. Paraffin wax may be driven into a concrete floor by heating the floor and treating it with melted paraffin wax. The object of heating the floor is, of course, to obtain penetration of the wax. The turpentine in No. 2 above is used as a carrier to cause the paraffin to penetrate into the concrete surface.

### Coloured Floor Finish

It is often desirable to produce a coloured floor surface without resorting to a special floor tile or terazzo. Floors of this sort usually are not to be subjected to heavy abrasive traffic, so that such weakness as may be introduced by the use of colouring material in the top, or wearing, course is not important. Obviously, the colouring matter should be confined to the top course only.

Only mineral colouring pigments should be used, as other pigments fade rapidly and reduce the strength of the cement to a marked degree. Mineral colours vary in quality and show a tendency to fade, depending on their quality.

### Colouring of Concrete

In the construction of buildings, pavements, and concrete products in general, a simple and dignified variation in the surface treatment is obtained by the use of colour.

Colours may be produced by:—

1. The use of pigments incorporated in the cement.
2. The use of coloured aggregates.
3. Painting the surface with specially prepared paints.

### Colouring by the Use of Pigments

The colouring of concrete by means of pigments incorporated with the cement is perhaps the most widely used method, and offers a wide range of colours, and with care in manipulation the colours will possess a permanency not obtainable by any surface treatment.

In selecting suitable pigments, it must be borne in mind that Portland cement is strongly basic in character, and almost invariably contains free lime, and so the range of pigments is confined to the basic oxides, and some of the ochres, which are unaffected by lime, and are spoken of in the paint and pigment trade as "limeproof."

In passing, it may be stated that an ochre is usually a clayey earth impregnated with an oxide which imparts an intermediate tint, and, for this reason, must be used with caution, as an excess of an ochre in cement might readily cause a serious reduction in strength of the concrete.

A pure white is only obtainable by the use of white Portland Cement mixed with either white sand, crushed white quartz, ground marble, or ground white limestone. The use of white cements and aggregates also permit the use of delicate tints, which are obtained either by the use of pigments or coloured aggregates.

A very light grey color may be obtained by the use of hydrated lime with the concrete, but this method is very little used, a more definite colour being preferred.

(Continued on next page)



The following table gives the pigments recommended and their approximate quantities, and by suitable mixture the intermediate colours may be obtained. In mixing colours, it is well to remember that the power of the colour is in proportion to its fineness.

Colour	Pigment	Pounds of Colour to Bag of Cement (94 lbs.)
Black	Manganese Dioxide	10-12
Blue	Ultramarine Blue	5-6
Green	Light-Ultramarine Green	5-6
	Medium-Lime Green	7-9
	Dark-Chromium Oxide	8-10
Red	Iron Oxide	4-6
Bright Red	Pompeian or English Red	6-7
Sandstone	Red-Purple Oxide of Iron	4-6
Violet	Violet Oxide of Iron	6-8
Brown	Roasted Iron Oxide or Brown Ochre	6-8
Yellow or Buff	Yellow Ochre	6-8

In using colouring matter with concrete, the colour should always be mixed with the cement dry before any sand or water is added. Thorough mixing is essential to success, so that the mixture is uniform in colour, and so that full value is obtained from the admixture of pigment. A method of mixing that has been found to give very satisfactory results is to take one bag of cement spread on a concrete mixing board, the colour added, and well mixed by hand until uniform, then passed through a fine sieve (100 mesh, if possible) several times. The cement may then be stored away in a dry place, and drawn upon as required. After this mixing, the combination is treated in the same way as clear cement.

The rules of practice governing the use of coloured cement in concrete work follow in a general way those of clear cement, but certain facts have been brought out by experience which it is well to state here.

The colour of a concrete will be affected by:—

1. The consistency of the mortar and character of the cement and aggregates. Too dry a mix will yield a dull lifeless tone, and too wet a mix will yield irregularly coloured surfaces, due mainly to efflorescence.
2. A steel floating trowel gives a darker colour than the wooden float.
3. The protection of the surface: A concrete cured in sunlight will give a lighter colour than one cured in the shade. Proper curing is essential to a permanent colour.
4. Time between placing and finishing: Trowelling on partly hardened surfaces produces blotches.

### Colouring by Means of Exposed Aggregates

Many engineers and architects prefer to colour concrete by the use of coloured sand and gravels in the mortar which are exposed by scrubbing, etching or surface revealing.

Briefly, scrubbing consists in removing the forms while the concrete is still green, and then scrubbing the surface with wire brushes and water until the film of cement has been removed, and the clean sand and stone exposed. This process calls for a fair measure of skill, for if the concrete is allowed to remain too long, it will be too hard to remove the

film of cement from the outside of each particle of sand and aggregate; and if scrubbed when it is too soft, the surface may be damaged and difficult to repair.

Etching with acid is a further development of the scrubbing process. It consists in first washing the surface with dilute muriatic acid, and then with an alkaline solution, to remove all free acid, and finally with clean water in sufficient volume to cleanse and flush the surface thoroughly. The operation requires less skill than scrubbing, only judgment as to how far the acid etching should be carried. This process is confined to such aggregates as will not be affected by acids, such as sand or crushed granites. Limestones cannot be used, as they are disintegrated by acids.

Both the scrubbing process and the etching process are open to the objection that they are slightly more expensive than ordinary concrete finishes.

Another process of revealing aggregates, of very recent introduction, consists in treating the forms before pouring, or, in the case of pavements or other exposed surfaces, treating the surface of the concrete itself with a preparation, designed to prevent the outer film of concrete from setting. This action is controlled to prevent the setting to a certain definite depth and no further. This process has advantages over either the scrubbing or etching process, having a greater depth of penetration as desired, requires little, if any, skill in manipulation, and is perhaps the least expensive of any surface finish; moreover, it permits the use of a wider range of aggregates than either of the other two processes mentioned.

The finish obtained by any one of the above processes has been applied with equal success to trowelled surfaces, like pavements, to moulded forms, such as steps, balusters, etc., and to concrete placed in the forms in the usual way. It may also be applied to concrete made with coloured cements, as described before.

Warm tones can be secured by the use of crushed brick or red gravel, a dark coloured stone with a light sand gives a colour much resembling granite, fine gravel or coarse sand gives a texture like sandstone, and excellent effects can be produced by mixing the cement with screenings produced by crushing a natural stone of the desired colour.

The colours obtained by the selection of coloured stone are perhaps the most agreeable, and are without doubt the most durable, and certainly exhibit more life and variety and texture.

### Colouring by Means of Paints

Concrete surfaces may be painted by any one of three general methods:—

- (i) Linseed oil paints.
- (ii) Casein paints (water paints).
- (iii) Silicate or waterglass paints.

The last-mentioned is perhaps more of a cement process than a paint process, but as the method of application is similar to that of a paint, it is included and described here.

#### Linseed Oil Paints.

Linseed oil being a saponifiable oil, must never be brought into direct contact with free lime, such as occurs in all concrete surfaces. If this precaution is neglected, then saponification takes place, with the formation of lime soaps, and the destruction of the binding medium of the paint, causing unsightly blotches and the complete disintegration of the painting medium.



Before paint is applied to concrete, the concrete surface is treated with zinc sulphate, alum, dilute sulphuric acid, or similar process, the object being to convert any lime into the comparatively harmless gypsum, when paint may be applied in the usual manner, and gives the usual service of linseed oil paints.

#### Casein Paints.

Casein paints are preferable to linseed oil paints on concrete, but are limited to flat finishes, it being impossible to produce a glossy finish. The permanency of this class of paint is very much superior to that of linseed oil paints, and although applied to the surface only, become more or less an integral part of the surface, due to chemical reaction between the lime and the casein.

The casein paint calls for considerable skill in compounding, and should preferably be purchased from a reputable firm of manufacturers. The pigment to be used is incorporated with the casein paint, and is applied direct to the concrete surface without any previous treatment.

The binding medium being a compound of lime and casein, on exposure, is converted into carbonate of lime and free casein, giving a very tough and durable film, and one which, when thoroughly dry and hard, is very difficult of removal, casein being resistant to acid. This method has much to recommend it over the linseed oil paint method.

#### Silicate or Waterglass Paints.

This method, although more difficult of application, is well worth the extra trouble involved. It consists in depositing in the surface a cement formed by sodium silicate and one of the basic oxides. The ranges of colours is limited to certain of the basic oxides only. The following pigments are recommended:—

Black.  
White.  
Red.  
Biscuit.  
Green.

Manganese Dioxide.  
Zinc Oxide.  
Red Lead.  
Litharge.  
Chromium Oxide.

Intermediate shades may be obtained by the suitable admixture of these colours as desired.

The method consists in treating the surface of the dry concrete with a 10 per cent. solution of waterglass, allowing a reasonable time for this to penetrate, then applying the colour mixed to a suitable consistency with plain water, either by brushing or by spraying, and finally applying a sealing coat of 20 per cent. solution of waterglass, care being taken that the surface is not allowed to dry out at any stage of the process, or for a reasonable period of curing immediately following, seven to ten days if possible.

The colours and surface obtained by this method are quite permanent, and the silicate cement waterproofs and hardens the surfaces of the concrete, making it very resistant to abrasion and absorption.

The success of both the casein and the waterglass methods depends upon getting a film of colour and binding medium, **into** the surface, rather than **upon** the surface.

The commonest cause of failure in applied coats of colour has been the application of too thick a coat. While casein is a semi-plastic compound, the silicate cement is a rigid compound, of a differing co-efficient of expansion to concrete, consequently if this material is allowed to just form a coat upon the surface of the concrete, it must necessarily crack and scale, with expansion of the concrete due to temperature changes.

### QUANTITIES OF MATERIALS PER CUBIC YARD OF 1:2:4 RAMMED CONCRETE

Mix by volume as used on job.

Quantities in table expressed volumetrically as follows:—Bags of Cement; Cubic Yards of Fine Aggregate (F); Cubic Yards of Coarse Aggregate (C).

Quantities of mixing water include moisture in aggregate.

The minimum quantity of mixing water shown in the table will produce a dry mixture and the maximum quantity a wet mixture for average conditions.

Voids in Coarse Aggregate, Per Cent.	Voids in Sand, Per Cent.											
	30			35			40			45		
	Cement, Bags.	Aggregate, Cu. Yd. F.	C.	Cement, Bags.	Aggregate, Cu. Yd. F.	C.	Cement, Bags.	Aggregate, Cu. Yd. F.	C.	Cement, Bags.	Aggregate, Cu. Yd. F.	C.
5 Gallons of Water per Bag of Cement.												
30	4.9	.36	.73	5.0	.37	.74	5.1	.38	.76	5.2	.38	.77
35	5.1	.38	.76	5.2	.38	.77	5.3	.39	.78	5.4	.40	.80
40	5.3	.39	.78	5.4	.40	.80	5.5	.41	.82	5.6	.42	.83
45	5.5	.41	.82	5.6	.42	.83	5.7	.42	.85	5.9	.44	.87
50	5.7	.42	.85	5.9	.44	.87	6.0	.44	.89	6.1	.46	.91
5½ Gallons of Water per Bag of Cement.												
30	4.8	.36	.72	4.9	.37	.73	5.0	.37	.74	5.1	.38	.76
35	5.0	.37	.74	5.1	.38	.76	5.2	.39	.77	5.3	.39	.79
40	5.2	.39	.77	5.3	.39	.79	5.4	.40	.80	5.5	.41	.82
45	5.4	.40	.80	5.5	.41	.82	5.7	.42	.84	5.8	.43	.86
50	5.7	.42	.84	5.8	.43	.86	5.9	.44	.87	6.0	.45	.90
5¾ Gallons of Water per Bag of Cement.												
30	4.8	.36	.71	4.9	.36	.72	5.0	.37	.74	5.1	.38	.75
35	5.0	.37	.74	5.1	.38	.76	5.2	.38	.76	5.2	.39	.78
40	5.2	.38	.76	5.2	.39	.78	5.4	.40	.79	5.5	.40	.81
45	5.4	.40	.79	5.5	.40	.81	5.6	.41	.83	5.7	.42	.84
50	5.6	.41	.83	5.7	.42	.84	5.8	.43	.86	6.0	.44	.88
6¼ Gallons of Water per Bag of Cement.												
30	4.7	.35	.70	4.8	.36	.71	4.9	.36	.73	5.0	.37	.74
35	4.9	.36	.73	5.0	.37	.74	5.1	.38	.76	5.2	.38	.77
40	5.1	.38	.76	5.2	.38	.77	5.3	.39	.78	5.4	.40	.80
45	5.3	.39	.78	5.4	.40	.80	5.5	.41	.82	5.6	.42	.83
50	5.5	.41	.82	5.6	.42	.83	5.7	.42	.85	5.9	.44	.87
6½ Gallons of Water per Bag of Cement.												
30	4.7	.35	.69	4.8	.35	.70	4.8	.36	.72	4.9	.37	.73
35	4.8	.36	.72	4.9	.37	.73	5.0	.37	.74	5.1	.38	.76
40	5.0	.37	.74	5.1	.38	.76	5.2	.39	.77	5.3	.39	.79
45	5.2	.39	.77	5.3	.39	.79	5.4	.40	.80	5.5	.41	.82
50	5.4	.40	.80	5.5	.41	.82	5.7	.42	.84	5.8	.43	.86



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### Products

Commons, Patent and Dome Kiln.  
Seconds and Clinkers.  
Face, extensive variety of colours and sizes.  
Fancy Moulds.  
Fancy Moulds Specials, made to design.  
Rough Cast Bricks, various sizes and colours.

### Facilities

The works are situated at Homebush Bay and enjoy every facility for quick and efficient delivery, being served by water carriage as well as by rail.

Delivery to distant suburbs is provided by rail, but supply can be given to city jobs, also those in the Eastern and Western suburbs, direct by up-to-date motor lorries, which deliver the bricks in boxes. Besides preserving the quality of the bricks, due to a minimum of handling, builders appreciate the benefit of receiving the bricks in boxes as they are able to hoist them and deposit them exactly where required. In many cases bricks are placed alongside the bricklayers on the highest city buildings, and from the time that they have been loaded from the kilns at the yard are not handled again until received by the bricklayers.

The box method is also very adaptable for supplies by water carriage.

### Range

The works are in a very favourable position to supply a comprehensive range of face and moulded bricks, as there are fifteen down draft kilns in operation. A very extensive business has been built up in the moulded brick department, and reference to the various moulds displayed herein will furnish some idea of the revived demand for ornamental brickwork.

Architects should note that, in addition to the moulds displayed, practically any shape or size can be manufactured to design submitted.

In all cases where moulded bricks are specified ample notice should be supplied by the builder, owing to the difficulty in stocking this class of ware in all colours and designs. Rough texture bricks in regular sizes are stocked. A popular size for fireplace design is also available, viz.— $6\frac{1}{2} \times 1\frac{1}{2} \times 3\frac{1}{4}$ . They can also be used to advantage in other architectural designs which will readily be appreciated by craftsmen.

Bricks measuring 10 inches in length, adaptable for soldier courses, can also be obtained.

### Quality

The products from this Undertaking can safely be used for all classes of building construction. The whole of the bricks used in Railway construction, where most of the work is of an exacting nature, have been supplied from this source. They completely satisfy all standards, as regards appearance, crushing strain, etc. It may be pointed out that the whole of the bricks used in the City Railway for retaining walls, underground tunnels, subways, ect., amounting to many millions, were supplied from the Homebush Bay Works. Many of the largest buildings also testify to their popularity.

### Architectural Brick Development

Although other materials, such as concrete, sandstone, trachyte, etc., all have a place in architectural design, the beauty of good brickwork, with a colour range all of its own, will never lose its power of appeal.

This Undertaking has for some time realised the necessity of widening the scope of its Face and Moulded Brick departments, and has succeeded in producing a very wide range of colours, which give very pleasing results, both in plain or mixed colour schemes. Recently there has been quite a revived demand for moulded bricks, as many as thirty different moulds having been used on a single building on several occasions. A glance at the colour panels and fancy moulds displayed should prove interesting. The panels shown herein were, of course, selected to furnish some idea of the colours stocked, also the scope existing for the very fine colour treatment that can be applied to brickwork. It will be readily appreciated that many other effects, quite as pleasing, can be readily arranged. The works are always in a position to supply large quantities of face bricks on short notice, but, as previously mentioned, orders for moulded bricks, especially those to an Architect's own design, should be submitted about four or five weeks before they are required, in order to allow time for preparation of moulds, and the requisite period for burning.

### SERVICE TO ARCHITECTS

Every effort is made to give full satisfaction to clients. Although the yard is situated about ten miles from the city, the journey can be made in less than thirty minutes by car, and, prior to the commencement of any contract, it has proved a very wise policy for the Architect and Builder concerned to attend and select the bricks required. A visit can always be arranged on the shortest notice to the Head Office, Bridge Road, Pyrmont.

### REFERENCES.

A few of the contracts supplied by this undertaking are set out below:—

Coronation Hotel, Park Street, Sydney.  
Oxford Hotel, Bridge and Lyons Roads, Drummoyne, N.S.W.  
Court House Hotel, Oxford Street, Darlinghurst, N.S.W.  
Kentish Hotel, Broadway, Glebe, N.S.W.  
Croydon Park Hotel, Georges River Road, N.S.W.  
Earlwood Hotel, Earlwood, N.S.W.  
Hotel St. James, Market and Elizabeth Streets, Sydney.  
Rose Bay Hotel, N.S. Head Road, Rose Bay, N.S.W.  
McIlraith's Building, Pitt and Goulburn Streets, Sydney.  
Presbyterian Church, Wynyard Square, Sydney.  
Santa Sabina, The Boulevard, Strathfield, N.S.W.  
St. Bede's, Church of England, Drummoyne, N.S.W.  
Christian Brothers, Albert Road, Strathfield, N.S.W.

St. Mark's Church, Tranmere Street, Drummoyne, N.S.W.  
St. Joseph's Church, Liverpool Rd. and Baker St., Enfield, N.S.W.  
Stella Maris Convent, Long Bay, N.S.W.  
"The Chequers," Redmyre Road, Strathfield, N.S.W.  
"Hampden Court" Flats, Darlinghurst, N.S.W.  
"Brook House," O'Connell Street, Sydney.  
"Watson House," Bligh Street, Sydney.  
Grace Building, York Street, Sydney.  
N.S.W. Govt. Savings Bank, Castlereagh Street, Sydney.  
Beharfeld's Building, George Street, Sydney.  
Minehan's Building, Park Street, Sydney.  
Manchester Unity Building, Castlereagh Street, Sydney.  
Animal House, University, Sydney.  
B.M.A. Building, Macquarie Street, Sydney.

(Continued on next page)





Pleasing effects obtained  
with a wide range of  
colours and the use of  
coloured mortars.

Panel No. 1  
(above)

Panel No. 2  
(at right)

Panel No. 3  
(below)

(Panels Nos. 4, 5 and 6  
are shown on a later  
page).

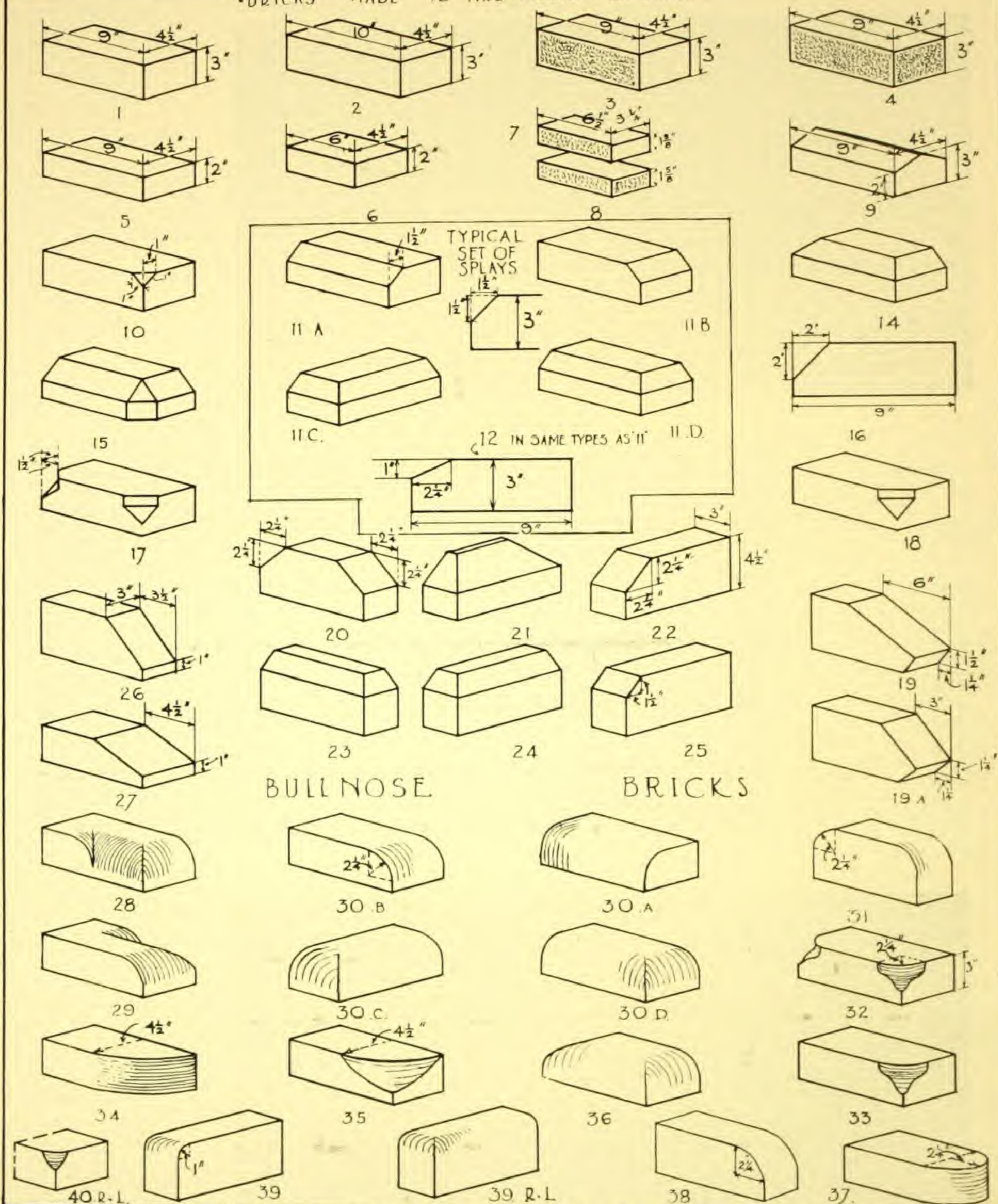


There is no limit to the  
uses of face brick—from  
the simplest bungalow  
to the most elaborate  
office building.

(Continued on next page)



• BRICKS MADE TO ARCHITECTS' DESIGNS •

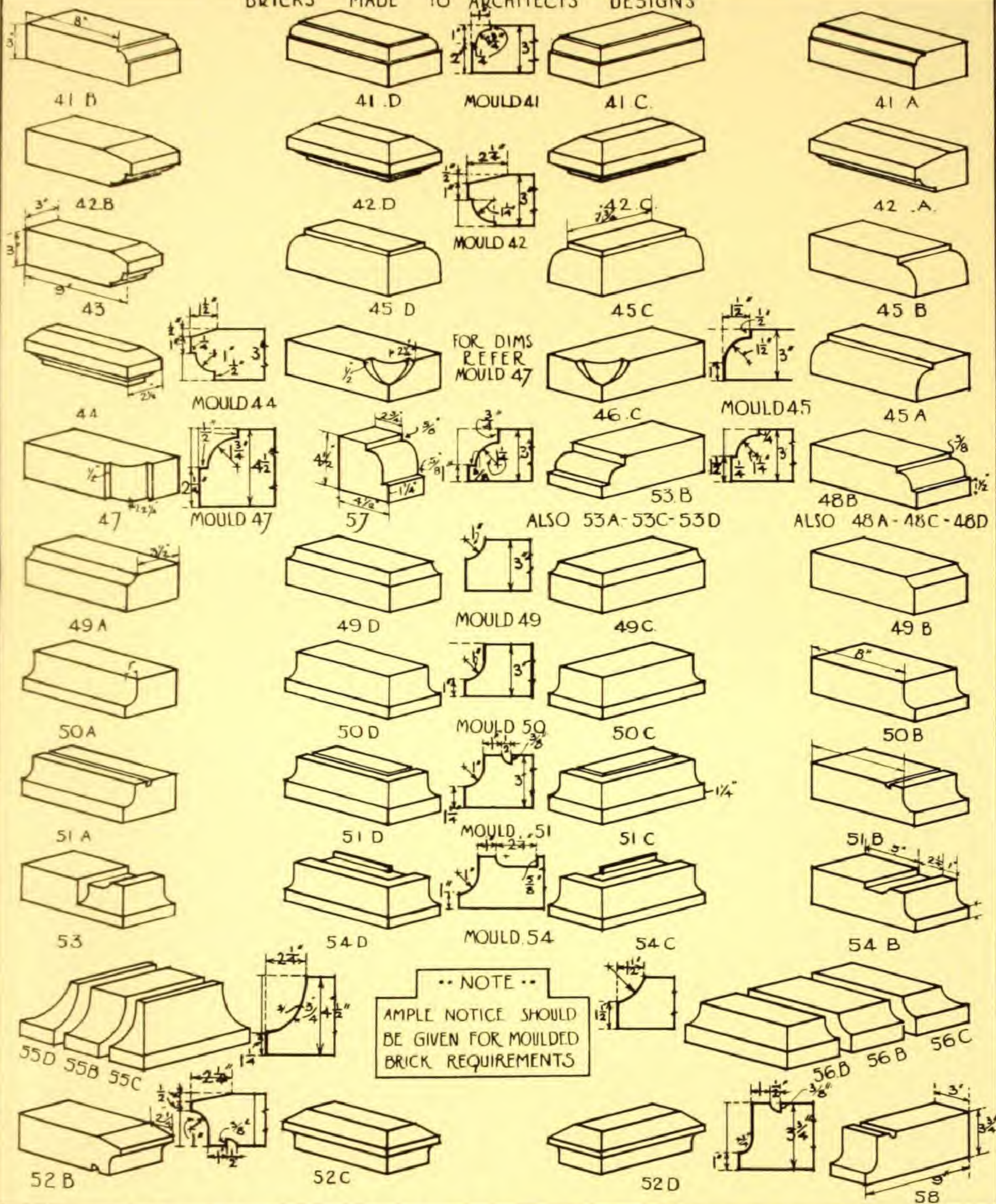


**N.S.W. STATE BRICK WORKS**  
 BRIDGE ROAD PYRMONT  
 WORKS HOMEBUSH BAY

DRAWING  
 No 1



## BRICKS MADE TO ARCHITECTS' DESIGNS



**N.S.W. STATE BRICK WORKS**  
 BRIDGE - ROAD PYRMONT  
 WORKS HOMEBUSH BAY

**DRAWING**  
**Nº 2**



BRICKS MADE TO ARCHITECTS' DESIGNS



60.B



60.D



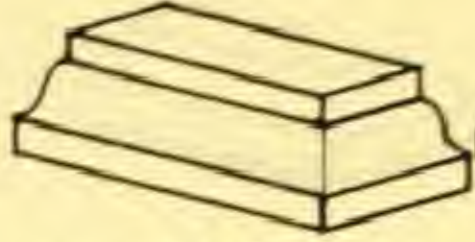
60.C



60.A



61.B



61.D



61.C



61.A



62.B



62.D



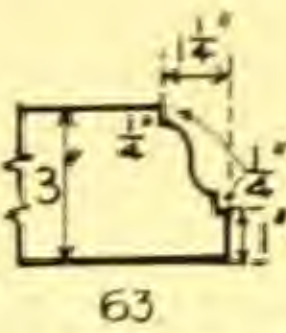
62.C



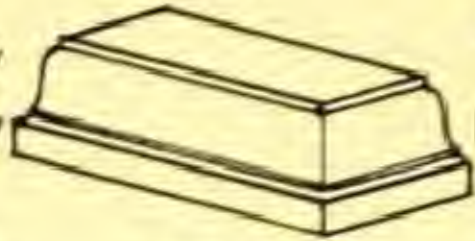
62.A



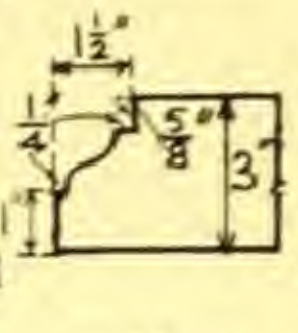
63.B



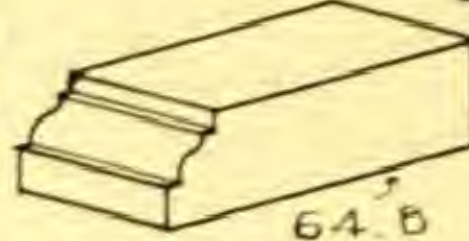
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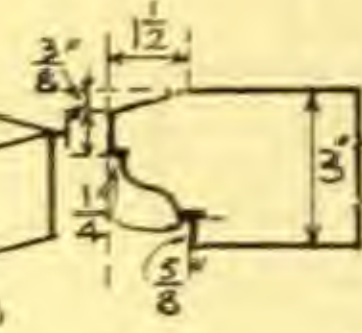
63.D



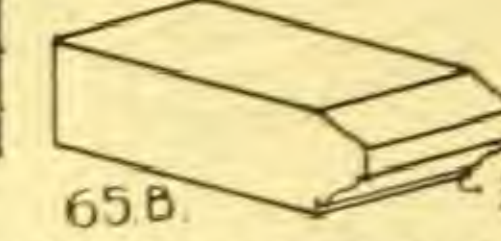
64



64.B



65



65.B

ALSO 65.A. 65B. 65C.



66.B



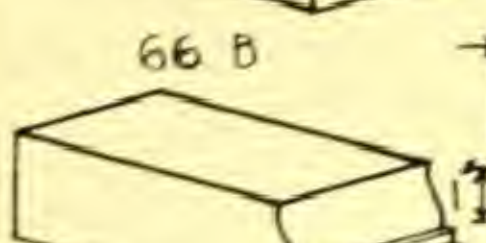
66.D



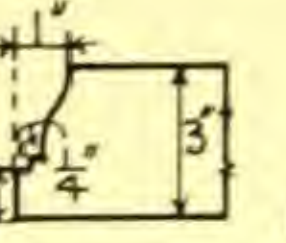
66.C



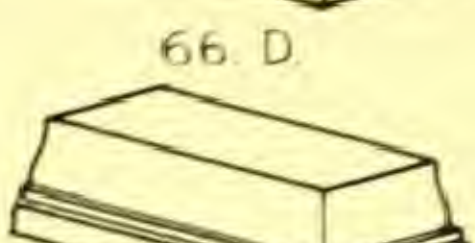
66.A



67.B



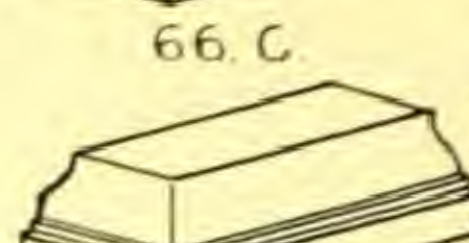
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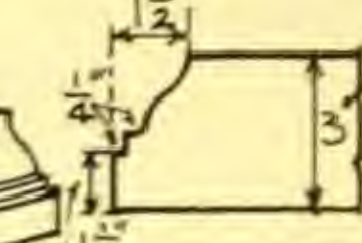
67.D



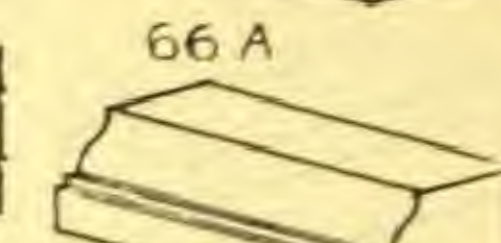
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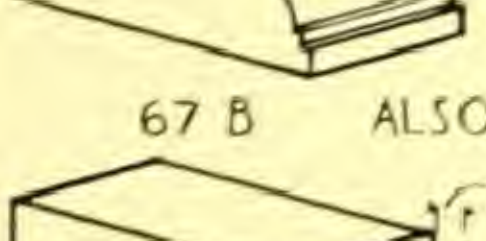
68.C



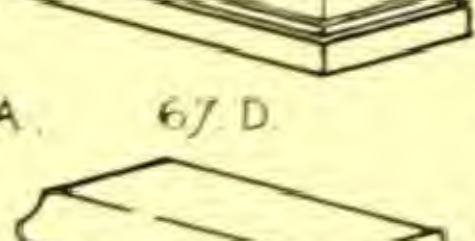
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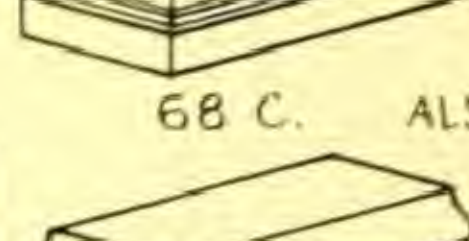
69.A



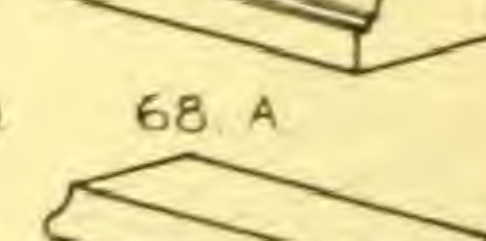
69.B



69.D



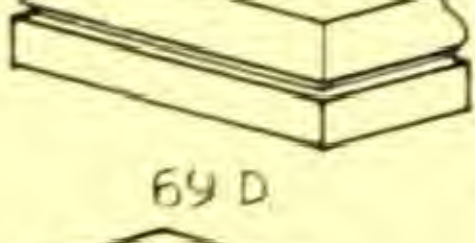
69.C



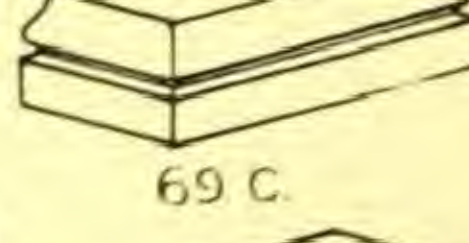
69.A



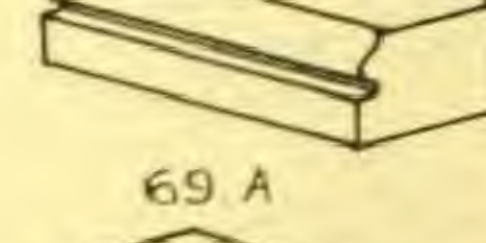
70.B



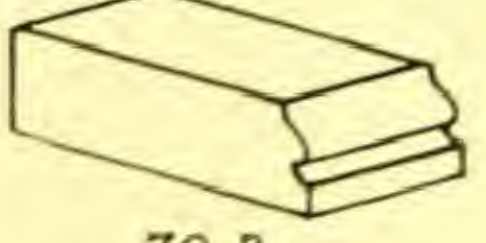
70.D



70.C



70.A



71.B



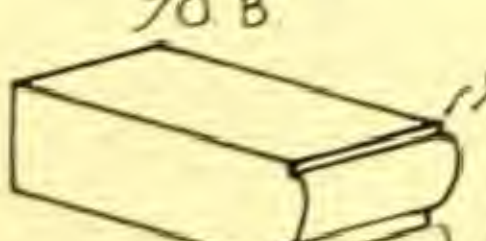
71.D



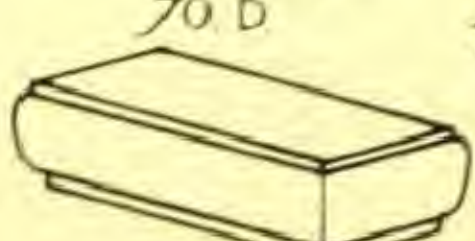
71.C



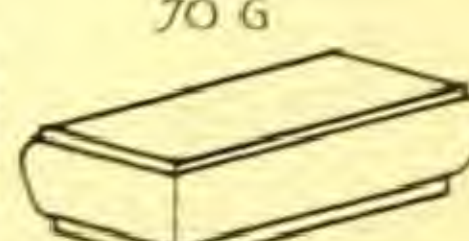
71.A



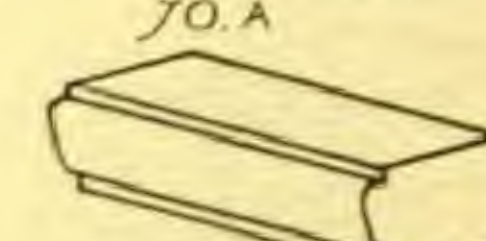
72.B



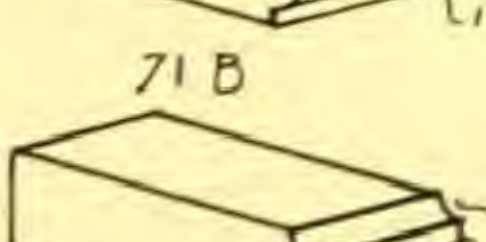
72.D



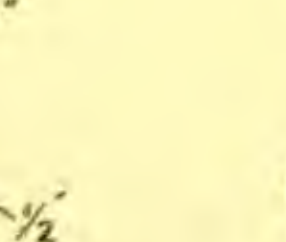
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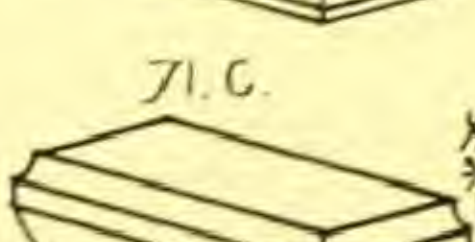
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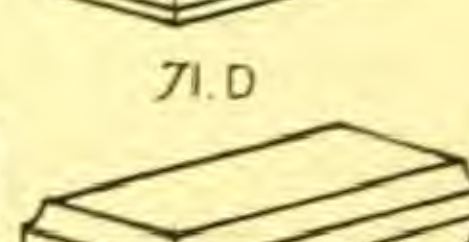
73.A



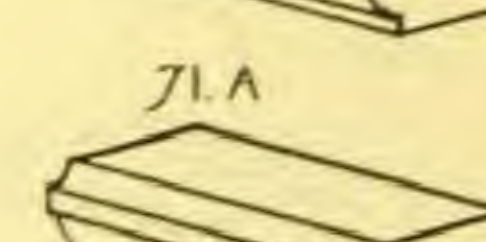
73



73.B



73.D



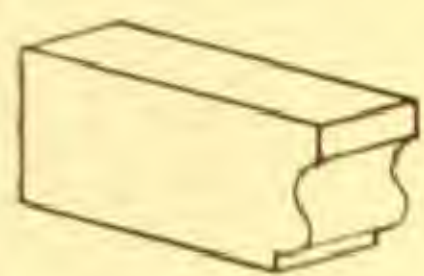
73.C

**N.S.W. STATE BRICK WORKS**  
 BRIDGE ROAD PYRMONT  
 WORKS HOMEBUSH BAY

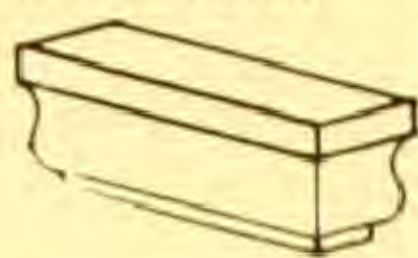
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**Nº 3**



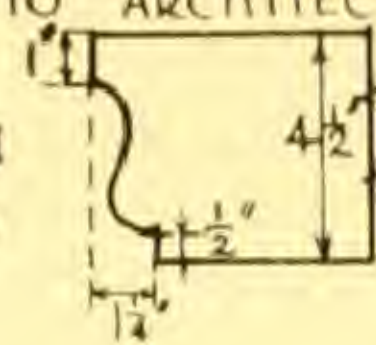
BRICKS MADE TO ARCHITECTS' DESIGNS



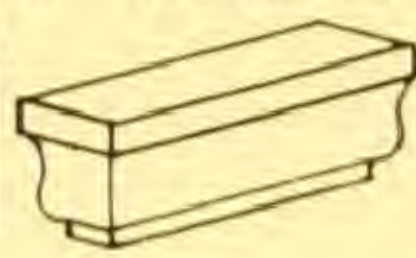
75 B



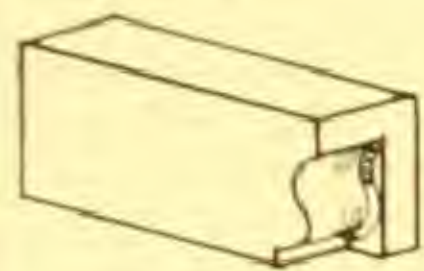
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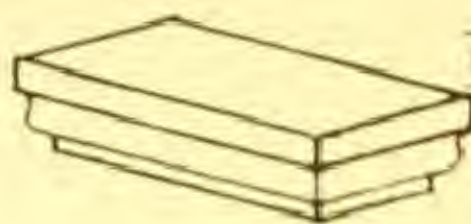
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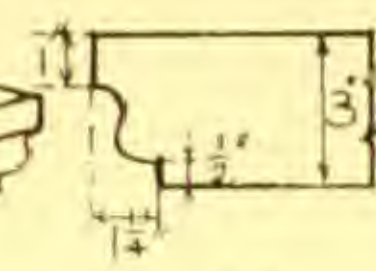
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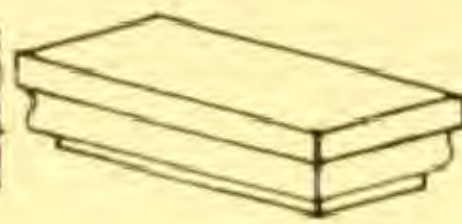
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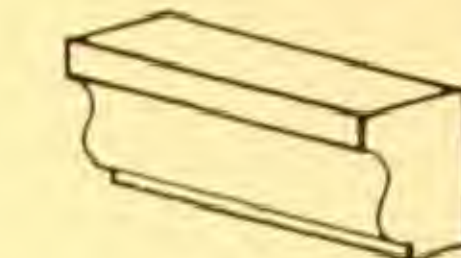
77 D



77



77 C



77 A



76



78 B

ALSO 78 A 78 C 78 D



81



82



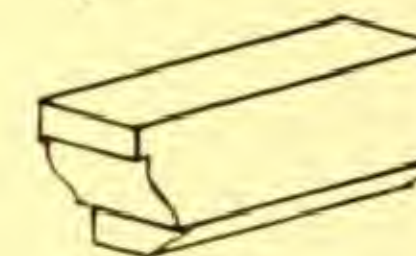
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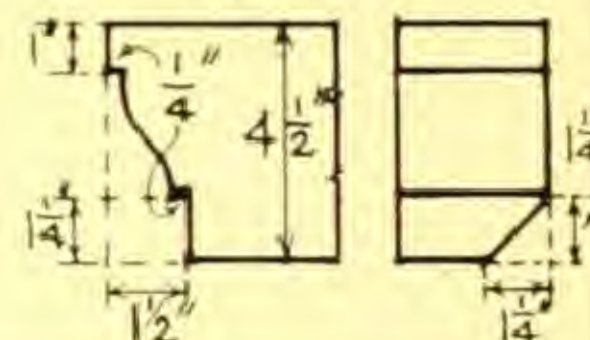
77 B



79



80



Panel No. 5.



Panel No. 6.

**N.S.W. STATE BRICK WORKS**  
 BRIDGE ROAD PYRMONT  
 WORKS HOMEBUSH BAY

**DRAWING**  
**No 4**



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[For Other Products, See Pages 55, 93, 102, 176 and 240]

### Description

Wunderlich "Colortex" Bricks are Face-Bricks with a textured finish, and are available in a range of colour harmonies never offered previously to the Australian Building Industry. They are made from natural clays, burned to extreme hardness.

### Colours

The beautiful and distinctive shades of Wunderlich "Colortex" Bricks are due to the careful selection and blending of the clays, and the expert application of intense firing. There are available colour harmonies of red, brown, yellow and green, as exemplified in the illustration below. The effects vary from dull matt to a high flash. By the intermingling of various colour harmonies and flashed effects, endless combinations are possible.

### Texture

The standard surface finish is a vertical rough texture (see illustration), but we can supply various other textures, to order.

### Standard Sizes

"Colortex" Bricks are made in two standard sizes:—

9 in. x 4½ in. x 3 in. and 9 in. x 4½ in. x 2 in.

In addition, we can readily manufacture special moulded forms, thus affording the architect unusual freedom in the designing of base and string courses, architraves, door-jambs, corbels, etc.

### Architectural Possibilities

The real significance of "Colortex" Bricks is that they enable the architect to achieve, with a standard architectural medium, those much-admired chromatic and textural effects which have previously been possible only by the employment of a material made specially to order.

### Ideal for Facades

Using "Colortex" Bricks, it is possible to impart particular attractiveness and colour richness to a facade treatment, without adding noticeably to the cost of the structure.

### Display Panels

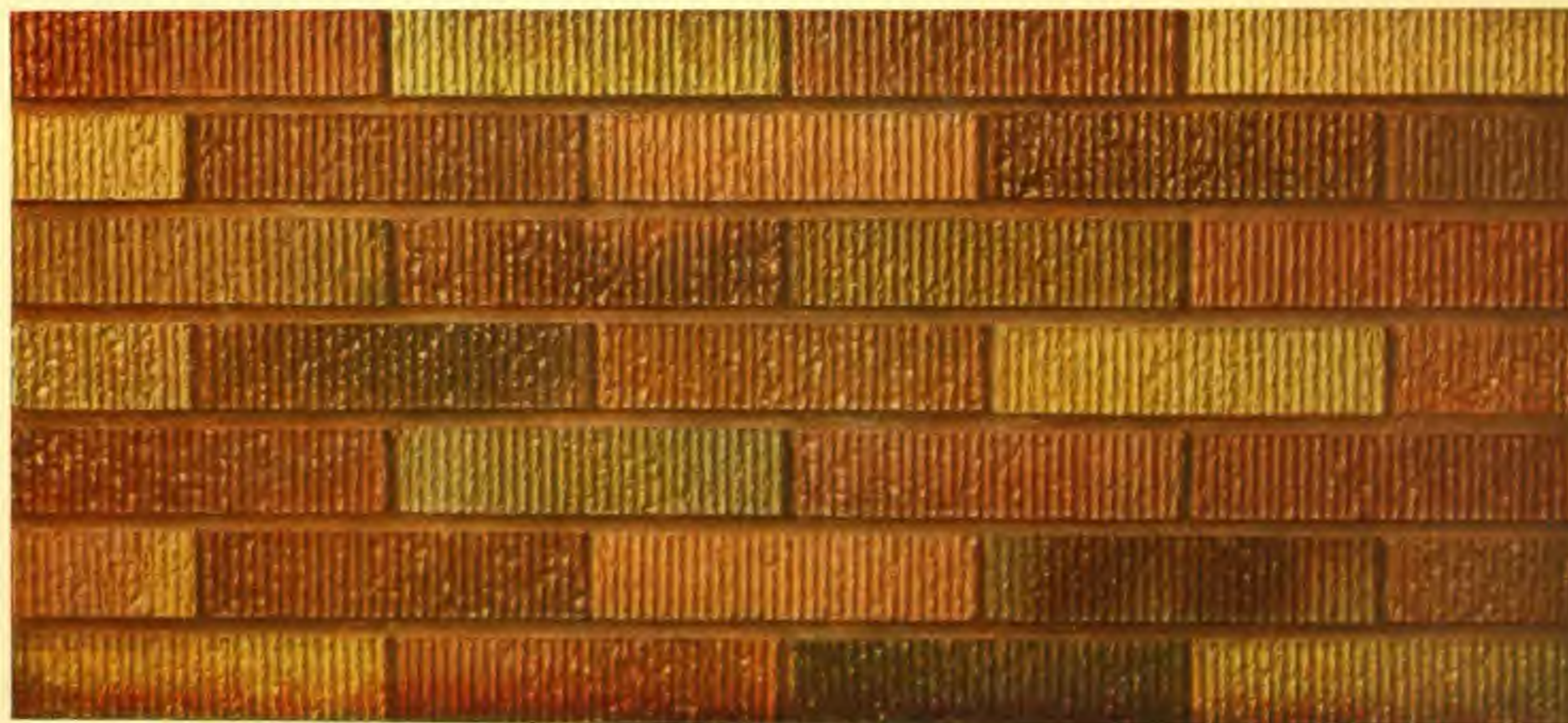
At our Showrooms, we have assembled a variety of panels displaying some of the effects attainable with "Colortex" Bricks. Architects desiring to make a selection are invited to inspect these displays.

### Prices

It is not possible to quote reliable prices, on account of different conditions operating in the various States; but architects can obtain this information promptly by applying to our nearest Sales office.

### Fireplace Briquettes

Also available are Wunderlich Briquettes, for fireplaces. Like "Colortex" Bricks, these can be obtained in numerous colour harmonies and glazed effects. Blueprints showing suggested applications will be furnished on request. Samples are on view at our Showrooms.



This illustration, reproduced from colour photographs of the actual product, demonstrates the wide range of colour harmonies available in Wunderlich "Colortex" Bricks. The example shown is composed of the smaller standard size, viz., 9 in. x 4½ in. x 2 in.

(CONTINUED ON NEXT PAGE)



**METAL  
AND  
TERRA  
COTTA  
PRODUCTS**

# WUNDERLICH LIMITED

Manufacturers of

## Wunderlich Building Materials

Administration: BAPTIST STREET, REDFERN, SYDNEY, N.S.W.

Showrooms and Offices:

SYDNEY: Baptist Street, Redfern.  
STH. MELBOURNE: 210 Hanna Street.  
ADELAIDE: Grote and Morphett Streets.  
PERTH: Lord and Short Streets.

BRISBANE: Amelia Street, Valley.  
NEWCASTLE: Builders' Exchange, King St.  
HOBART: 139 Macquarie Street.  
LAUNCESTON: 71 St. John Street.



[For Other Products, See Pages 55, 93, 102, 176 and 240]

### Products

Wunderlich Building Materials include several Products of outstanding importance, and these are featured separately in this Catalogue. Others of lesser significance, although widespread in their application, are mentioned below. They are classified as (a) Metal and (b) Terra Cotta.

### Wunderlich Metal Products

Galvanized EXTERIOR WALL LININGS, in Sheets measuring 6 ft. by 3 ft. and 6 ft. by 2 ft.; patterned to imitate Roughcast, Rockface and Brickwork. Particularly effective for Shop premises, Public Halls and Cinemas in country districts.

Galvanized FISHSCALE SHEETING, size 6 ft. by 3 ft., for Turret Roofing, Gable Fillings, etc.

Galvanized SHINGLE PATTERN, in Sheets 6 ft. by 3 ft., for Gable Fillings and Balcony Fronts.

Zinc, Copper and Galvanized Steel INTERLOCKING TILES, with secret fixing; for Domes, Turrets and Mansard Roofs. Rectangular and Diamond patterns.

Zinc HIPROLLS and CRESTINGS, in various ornamental designs; supplied in approximate 7-ft. lengths.

Zinc FINIALS and WEATHERVANES; stocked in a wide range of designs.

Galvanized WINDOW HOODS, comprising Fishscale Pattern Hood, ornamental Brackets and Frieze; made in parts for ready assembling with bolts and nuts.

Galvanized VENT RIDGING, birdproofed, as approved by Public Health Departments; suitable for Churches, Cinemas, and other buildings where roof ventilation is required.

Galvanized LOUVRED VENT PANELS for Walls and Roofs; made to any dimensions.

"Hit or Miss" METAL WALL VENTILATORS, sizes 9 in. by 6 in. and 9 in. by 3 in.; with adjustable slide to regulate the volume of air admitted.

Galvanized UPDRAFT ROOF COWLS, with tubing, Bellmouths and Bellmouth Rings, to any dimensions.

Hurricane SKYLIGHTS, entirely of Galvanized Steel. Can be used with tile, slate or iron roofs. Puttyless glazing.

All metal GLAZING BARS for Glass Roofs; with or without Tee Iron Reinforcement. Made for overlapping sheets of glass, or for single

lengths. Puttyless, and with ample allowance for expansion and contraction.

Zinc CAPITALS and CONSOLES, in a wide range of designs, for enrichment to columns and beams.

Metal CEILING CENTREFLOWERS of various designs and sizes, for ceiling ventilation.

Steel and Galvanized "WUNDERTILE" SHEETING, in Sheets 6 ft. by 2 ft.; patterned to look like 4-inch square tiles. Suitable for the lining of Bathrooms, Kitchens, Corridors, Counter Fronts, etc.

METAL LETTERS, with or without vitreous enamel filling; for signs to buildings.

NAMEPLATES; cast, stamped, repousse or built, for city buildings and also for dwellings.

DIRECTORY BOARDS, in metals or wood, for entrances and vestibules of Office Buildings, etc.

AWNING FASCIAS in a variety of designs, and in copper, zinc or galvanized steel, for modern suspended awnings.

### Wunderlich Terra Cotta Products

Hooded and Louvred Terra Cotta AIR BRICKS, sizes 9 in. by 6 in. and 9 in. by 3 in., for Wall Ventilation; offering protection from driving rains.

Terra Cotta LETTER BOX BRICKS, size 9 in. by 6 in., for front fences or gate piers.

Terra Cotta CHIMNEY POTS, square and circular, with or without hoods; in various sizes.

GARDEN ORNAMENTS, including Vases, Flower Boxes, Sun Dials, Bird Baths and Garden Seats, in glazed and unglazed Terra Cotta of standard colours.

Terra Cotta FLOORING TILES, sizes 8 in. and 6 in. square, with rectangular and triangular half tiles to match; made in shades of red and chocolate.

FIREPLACES to stock designs, in Glazed Terra Cotta.

### Printed Literature

Illustrations, prices and printed literature relating to these Wunderlich Products will be furnished, post free, on request.

### Displays at Showrooms

Interesting examples of Wunderlich sundry manufactures, in Metal and Terra Cotta, are displayed at our Showrooms in each State.



Terra Cotta  
Louvre Vent.



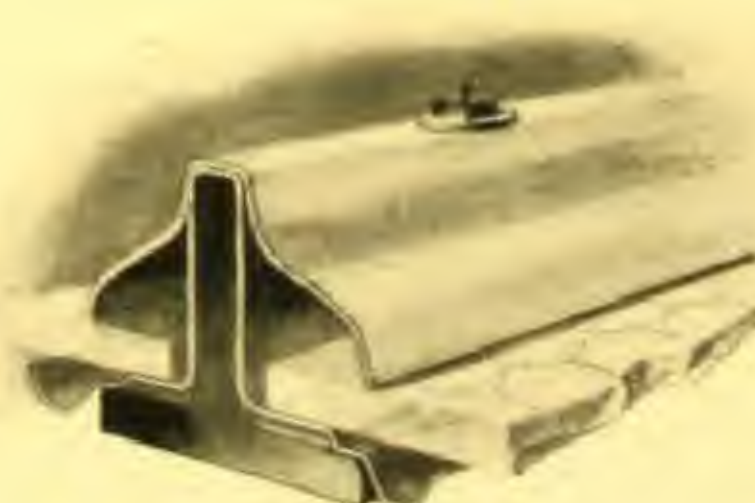
Hinged and Ventilated  
Galvanized Skylight.



Terra Cotta  
Chimney Pot,  
with Hood.



Garden Vase in Terra  
Cotta (Glazed or  
Unglazed).



Glazing Bar, made for both over-  
lapping and single sheets of glass.



4e

S.A.A. File No.

# THE AUSTRALIAN REINFORCED CONCRETE ENGINEERING COMPANY PTY. LTD.

Head Office: NORMANBY CHAMBERS, CHANCERY LANE, MELBOURNE.

Works: SUNSHINE, VICTORIA, AND STRATHFIELD, N.S.W.

Agencies: SYDNEY, BRISBANE, ADELAIDE, PERTH, HOBART,  
NEW ZEALAND

**B.  
R.  
C.  
FABRIC**

[For Other Products, See Page 484]

## Products

B.R.C. Electrically Cross-Welded Steel Wire Fabric for Floors, Roads and Slabs—B.R.C. Systems of Reinforced Concrete Construction—B.R.C. Lintel, Beam and Column Reinforcing Units—B.R.C. Hoops, Helical Wrappings and Stirrups—B.R.C. Reinforcements for Standard Piles, for Bunkers, Silos, Bridges, Retaining Walls, Piers, Culverts, Sewers, Water Mains, Bathing Pools.

## Manufacturing Plant

At Sunshine, Victoria, and at Strathfield, N.S.W., we have established up-to-date plants for the manufacture and fabrication of our Reinforcements from Australian Steel.

## Description and Details of B.R.C. Fabric

### Material and Manufacture

B.R.C. Electrically Cross-Welded Steel Wire Fabric is the ideal reinforcement for concrete slabs and surfaces. It consists of a wire mesh made up of a series of parallel longitudinal wires, held at fixed distances apart by means of transverse wires arranged at right angles to the longitudinal ones, being securely welded to them at the points of contact by a patented electrical process.

The wire used is best quality hard drawn mild steel.

The longitudinal wires, which may be of any gauge, are automatically drawn from supply reels through a machine, which accurately spaces them at fixed distances apart. The progress of the longitudinal wires through the machines stops momentarily at definite intervals, whilst a single strand of transverse wire is placed across the longitudinal ones at right angles to their length. At each point where the transverse wire crosses the longitudinal, there is then formed an electrical contact, which thoroughly fuses the metal of the two wires together.

The appearance of the finished product is illustrated in the accompanying photograph of a roll of B.R.C. Fabric. In this view the unrolled portion of the fabric clearly shows the perfect alignment of the wires, and the efficient manner in which they are held in their proper relative positions.

### Nature of Weld

If any two wires are cut through at their point of union, the character of the weld is most noticeable, revealing a perfectly smooth surface in which it is impossible to detect the slightest evidence of separation between the wires. Even when seen through a microscope, this surface shows absolutely smooth and unbroken.

In view of the fact that the transverse wires are not secured to the longitudinal ones by means of wire loops or clips, the casual observer is led to the conclusion that the wires are merely soldered together, or connected in

some frail manner. Such a conclusion is completely erroneous. The connection is made by an absolute and perfect weld, the two wires having been fused, and become actually homogeneous through the application of an electric current.

Sample strands of B.R.C. Electrically Cross-Welded Steel Wire have been subjected to tests such as, tension until broken, and bending and twisting to complete distortion, yet never in hundreds of such tests has a wire broken directly at the weld. There is no doubt that the strength of the wire at the points of welding is greater than elsewhere.

### Spacing of Wires

Every strand of the wire entering into the construction of B.R.C. Fabric is, through its process of manufacture, properly placed with mechanical accuracy. In this way is accomplished by machinery that essential element of construction, which in other types of reinforcing material is left in the hands of unskilled workmen after it has reached its destination.

B.R.C. Fabric is not shipped in a thousand and one separate parts, but in compact rolls, ready for installation as a perfect reinforcement made of the best grade of drawn steel wire, formed into a mesh.

The purchaser obtains a reinforcement wherein all the work has been accomplished at the factory by skilled mechanics and perfected machinery. It reaches its destination in such a form that it may be easily, rapidly, and economically laid.

## Advantages In Use

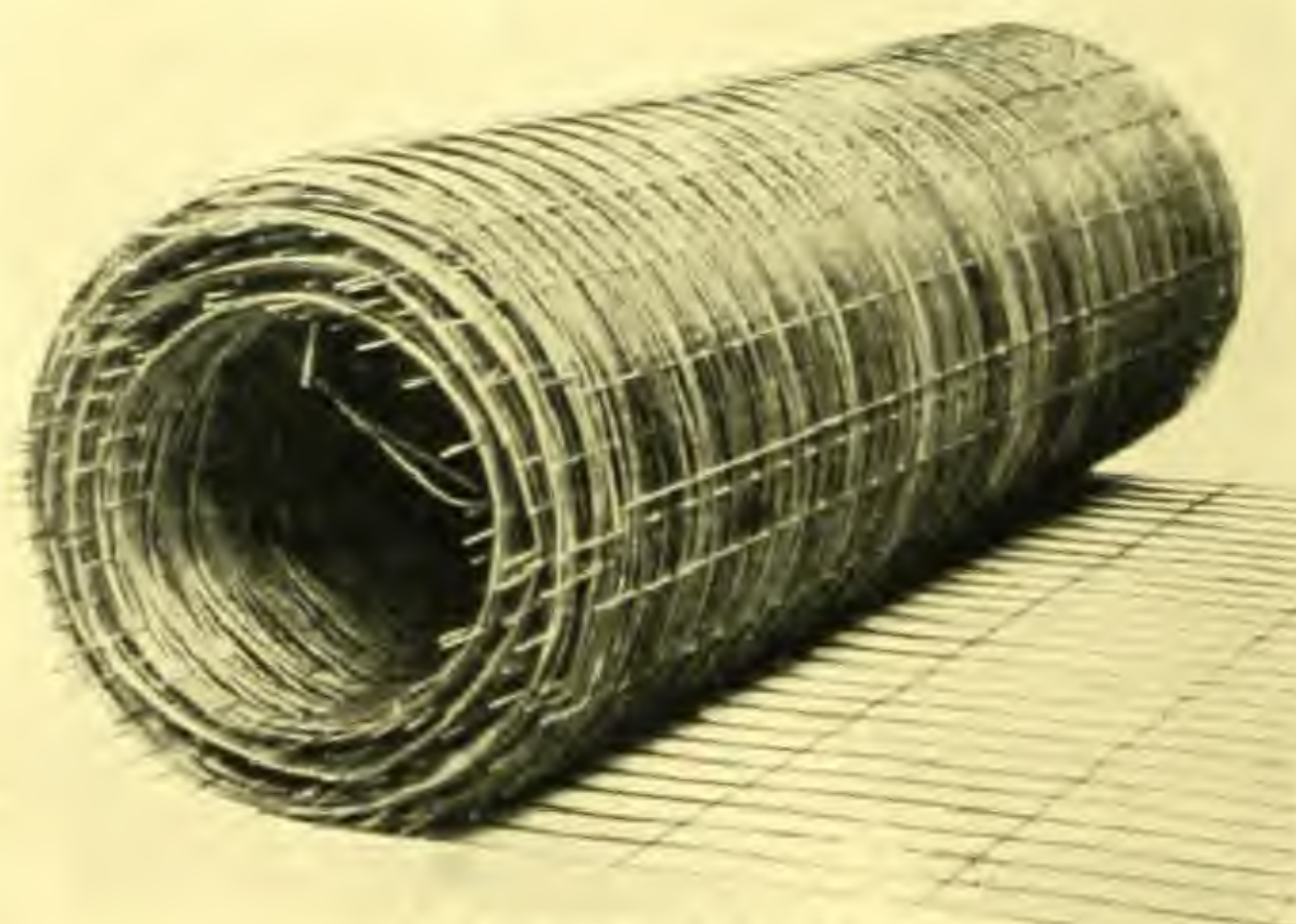
### Strength of Steel Wire

Every inch of wire that is introduced into the construction of our Cross-Welded Fabric is rendered through its very process of manufacture a material of tested and determined strength. Close-fibred steel, drawn under considerable strain, is much stronger and more durable than either rolled steel bars or stamped sheets, which undoubtedly suffer much injury through cold cutting and distortion.

In this respect B.R.C. Cross-Welded Fabric possesses an element of strength which cannot be claimed for the ordinary type of reinforcement. To further ensure reliability, every coil of wire is tested at our works, and is not utilised in our manufactures unless its tensile strength is equal to that on which our Tables are based.

### Rigidity

B.R.C. Cross-Welded Fabric provides the greatest possible rigidity, owing to its having an absolute physical connection at each point of intersection, thus overcoming the great defect of all other systems of rod or wire mesh reinforcement. In these other systems such absolute connection is non-existent.



A Roll of B.R.C. Fabric



### Continuity of Reinforcement

B.R.C. Cross-Welded Fabric is laid in sheets up to seven feet in width, and of any length. There is thus obtained a complete sheet of reinforcing material extending from end to end of the structure, and giving throughout its entire length a perfectly unbroken reinforcement of drawn steel wire, providing one single continuous beam, far stronger than the large number of separate units usually employed.

The transverse wires take up the transverse temperature stresses and distribute the "accidental" loads evenly over the longitudinal reinforcement.

### Direct Action in Reinforcement

It is a well-established principle that any structure in sustaining certain loads is deformed by those loads in such a way that the total work done by the resisting stresses in the material is a minimum. The most efficient type of reinforcing material is the one capable of resisting all tensile stresses in the simplest and most direct manner. Both theoretical and practical demonstrations show the fallacy of statements to the effect that a zig-zag, crimped, or indirect line of reinforcement, when embedded in the concrete, is as efficient as a direct line. It has been amply demonstrated that any irregularly-shaped mesh introduced into concrete, and placed close to the bottom of the slab, has a tendency to yield and shear or flake off the concrete on the underside, and to close up on deflection of the slab. B.R.C. Cross-Welded Fabric reinforces efficiently on direct lines of tension, and maintains its original form when stressed.

### Ease and Accuracy of Installation

The most important, and in many cases the most difficult, work in connection with the erection of reinforced concrete structures is the accurate placing of the steel. In order that a slab of concrete may safely sustain its superimposed load, it is not merely essential that it be provided with a certain amount of steel, but the steel, in order to do its duty, must be definitely located in the concrete.

Carelessness in regard to this important feature has led to several failures in structures of reinforced concrete. The greatest care should always be exercised in placing reinforcement.

Where single rods are used, or short sheets of reinforcement, a considerable expenditure of time and money is involved, as it is necessary to lay the pieces separately, to carefully space them, and then to fasten them in position. The correctness or otherwise of such positions is completely dependent on the man who is actually laying the reinforcement. The risk is eliminated by using B.R.C. Cross-Welded Fabric. It comes to the work in rolls, and can be neatly stored in a small space until required, and when required can be easily laid. The exact spacing of the wires is already established, and it is impossible for their relative position to become changed in the slightest degree either before or after laying.

### Flexibility of Design

B.R.C. Cross-Welded Fabric is not, like many other forms of reinforcement, an intricate system that admits of only restricted usage. It may be adapted to any type of construction, and in all cases provides a simple and efficient means of continuous reinforcement. It is commonly used in the construction of Foundations, Walls, Partitions, Slabs, Floors, Roofs, Bins, Tanks, Reservoirs, Sewers, Culverts, Bridges, Retaining Walls, Platforms, Pavements, Fireproofing of Steelwork, and flat or curved Concrete Surfaces of all kinds.



FRANCIS HOUSE, MELBOURNE  
1929 R.V.I.A. Award for Street Architecture.  
Architects—Messrs. Blackett and Forster.  
Reinforced throughout on the B.R.C. System.

averages 65,000 lbs. per square inch, and the safe working tensile strength may be taken at 25,000 lbs. per square inch.

### Spacing of Longitudinal and Transverse Wires

Longitudinal wires may be spaced on centres of three inches and upwards in steps of three inches. Our standard spacings are three inches, six inches, and twelve inches.

Transverse wires may be spaced on centres of two inches and upwards, in steps of two inches. Our standard spacings are six inches, twelve inches, sixteen inches, and eighteen inches.

### Guarantee Against Movement of the Welded Wire

Each point of intersection between longitudinal and transverse wires must develop at least one-half the full strength of the transverse wire before the bond securing the longitudinal and transverse wires shows any movement.

This result cannot be obtained by means of secondary fasteners, clips, or crimping.

### Sizes of B.R.C. Fabric

#### Type of Wire

The wire used is best quality mild steel. The tensile strength varies from 80,000 to 100,000 lbs. per square inch. The elastic limit

### B.R.C. Systems of Reinforced Concrete Construction

The B.R.C. Systems cover the whole range of Reinforced Concrete Construction in the simplest and most complete manner. The special features of the systems provide a margin of safety much in excess of the figure allowed for in ordinary calculations.

### Engineering Department—Designing Services.

The services of our Engineering Department are at the disposal of our clients. A staff of able and experienced engineers are ready to prepare and submit designs for all classes of reinforced concrete work, in which case the full responsibility for the design is taken, provided the reinforcements are supplied by us and correctly placed according to our plans.

(Continued on next page)



## Partial List of Structures in which B.R.C. Fabric and Reinforcements are used

STRUCTURE.	ARCHITECT OR ENGINEER.
T. & G. Mutual Life Assurance Society Ltd., new offices at Sydney, Melbourne and Adelaide	Messrs. A. & K. Henderson
Government Insurance Offices, Brisbane	G. G. Hulton, Esq.
Terminal Wheat Elevators, Glebe Island, Sydney	John S. Metcalf Co. Ltd.
Australian Gaslight Co.'s offices, Rockdale, N.S.W.	Messrs. Paynter & Dixon
Ainslie Hotel, Canberra, F.C.T.	Messrs. Birchan, Clamp & Finch
City Baths, Footscray, Victoria	A. E. McCausland, Esq., C.E.
Hotel Alexander, Melbourne	L. M. Perrott, Esq.
Ford Motor Works, North Shore, Geelong, Vic.	Messrs. Fyvie & Stewart
Grandstand, Williamstown Racecourse, Vic.	Albion H. Walkley, Esq.
Kurrajong House, Melbourne	Messrs. R. M. & H. M. King
A.N.A. Building, Adelaide	L. Gregory Bruer
Railway Station, Adelaide	Messrs. Garlick & Jackman
Motor Assembling Works for General Motors, Birkenhead, S.A.	Messrs. David Williams & Son
The Economic Stores Ltd., Perth	Messrs. Hobbs, Smith & Forbes
Y.W.C.A. Hostel, Auckland, N.Z.	B. B. Hooper, Esq.
Head Office, Huddart Parker Ltd., Wellington, N.Z.	Messrs. Crichton, McKay & Haughton

## Standard Sizes

The following tables give particulars of sizes, weights, strengths, and shipping dimensions of our standard

Fabrics, which can always be supplied at short notice. Standard sizes are the cheapest to buy and most quickly obtainable.

TABLE I  
PROPERTIES OF STANDARD SIZES

Reference No. of Fabric	SIZE OF MESH AND OF WIRE					TENSILE STRENGTH		Weight per Square Yard	SIZES AND WEIGHTS OF FABRIC				SHIPPING DIMENSIONS			
	Distance centre to centre of Longitudinal Wires (ins.)	Distance centre to centre of Transverse Wires (ins.)	Gauge of Wire		Sectional Area of each longitudinal wire (sq. ins.)	Breaking Strength of each wire (at 80,000 lbs. per sq. in.) (lbs.)	Safe Tensile Strength (at 25,000 lbs. per sq. in.) in lbs. per ft. width of fabric		Size of Sheet or Roll	Width of Standard Roll or Sheet (ins.)	Contents of Standard Roll or 5 Sheets (square yards)	Weight of Standard Roll or 5 Sheets (lbs.)	Contents of Bundle	Approx. Dimensions of Bundle		
			Longitudinal (Imperial Standard)	Transverse (Imperial Standard)										Length (ins.)	Dia. or Width (ins.)	Thickness (ins.)
1	3	16	4/0	4	.1257	10052	12600	16.34	17' 4"	84	67 4-9	1101	5 Sheets	210	86	3 1/2
2	"	"	3/0	4	.1087	8694	10900	14.26	"	"	"	961		"	"	3 1/2
3	"	"	2/0	6	.0951	7608	9500	12.29	"	"	"	828		"	"	3 1/2
4	"	"	1/0	6	.0824	6595	8200	10.75	"	"	"	725		"	"	2 1/2
5	"	"	1	6	.0707	5655	7100	9.31	"	"	"	628		"	"	2 1/2
6	3	16	2	6	.0598	4785	6000	7.98	180'	84	140	1118	1 Roll	89	31	
7	"	"	3	6	.0499	3990	5000	6.77	"	"	"	948		"	28	
8	"	12	4	8	.0423	3381	4200	5.79	"	"	"	811		"	27	
9	"	"	5	8	.0353	2824	3500	4.93	240'	"	186 1/2	921		"	27	
10	"	"	6	8	.0290	2316	2900	4.15	"	"	"	774		"	25 1/2	
11	3	12	7	8	.0243	1946	2400	3.59	240'	84	186 1/2	670	1 Roll	89	24 1/2	
12	"	"	8	10	.0201	1608	2000	2.85	"	"	"	532		"	24	
13	"	"	9	10	.0163	1303	1600	2.39	"	"	"	446		"	22 1/2	
14	"	"	10	10	.0128	1030	1300	1.97	"	"	"	368		"	21 1/2	
610	6	6	10	10	.0128	1030	650	1.57	"	87	193 1/2	309		90	26	
1210	12	12	10	10	.0128	1030	325	.78	"	"	"	160	1 Roll	"	20	
655	6	6	5	5	.0353	2824	1750	4.32	180'	84	140	605		"	32	
636	3	10	6	6	.0280	2316	2900	4.59	"	"	"	640		"	23	
98	9	10	8	8	.0201	1608	667	1.62	240'	84	186 1/2	302		89	25	
688	6	6	8	8	.0201	1608	667	2.40	180'	84	186 1/2	446		90	29	
93	9	9	3/0	3/0	.1087	8694	10900	8.86	*	84	(*Made to order as required)					



## LINTELS

## Lintels

The most frequent use of Lintels is to carry brickwork over window and door openings. Where a number of lintels occur in the same horizontal line with narrow intermediate supports, such lintels may be joined together to form a continuous girder. However, in the majority of cases they should be considered as being freely supported.

There are various conditions of loading, as follows:—

## Condition 1.

"Lintel in the middle portion of wall, or one of a series of lintels."

For practical purposes allow for weight of brickwork of a height equal to one-half the span.

## Condition 2.

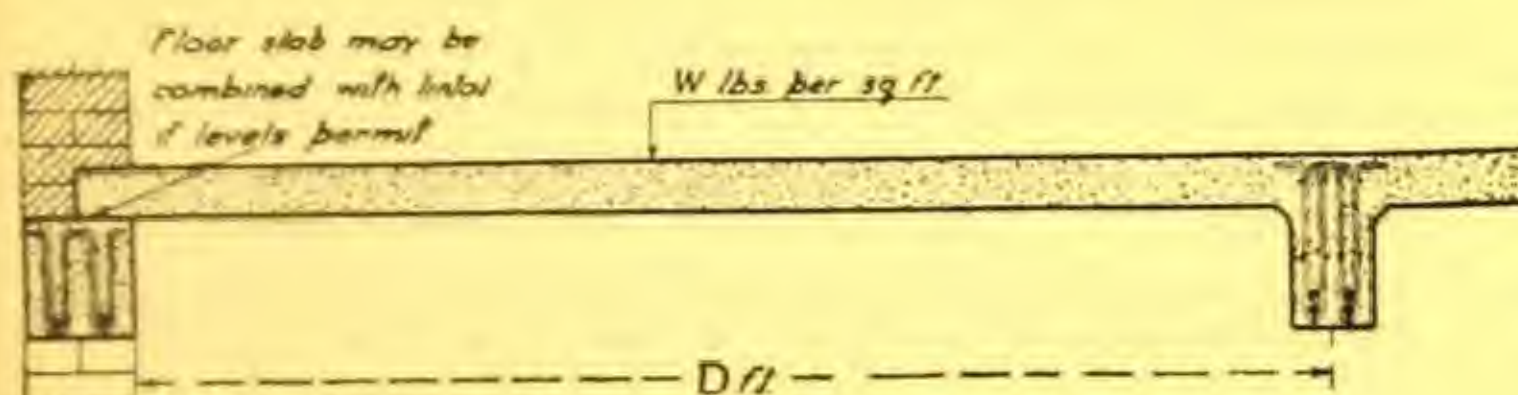
"One end of lintel close to end of wall."

Allow for weight of brickwork of a height equal to the full span, unless, of course, the actual height of brickwork over the lintel is less than this.

## Condition 3.

"Both ends of lintel close to end of wall," e.g., short wall.

Allow for a weight of the full height of brickwork over the lintel.



## Condition 4.

"Floor joists or slab resting on or over lintel."

Allow for the additional load from floor =  $\frac{WD}{2}$  lbs. per ft. run of lintel.

Where W = floor load (including weight of floor) in lbs. per sq. ft. of floor area,  
D = span of floor slab or joists in feet.

TABLE 3

Safe Loads in Lbs. per Foot Run of Lintel

Reference No.	Width of Beam (Ins.)	Depth of Beam in Courses of Brickwork	No. of Bars	Diam. of Bars (Round) (Ins.)	SPAN IN FEET									
					3	4	5	6	7	8	10	12	16	20
L11	4½	2	1	1/2" dia. bars 18" apart	870	490	310	220	160	120	80			
L12		2½	1		1030	580	370	260	190	150	90			
L13		3	1		2160	1220	780	540	400	310	200	140		
L14		3½	1		2450	1380	880	610	450	340	220	150		
L15		4	1		4220	2380	1520	1060	780	590	380	260	150	
L16		4	1		4620	2600	1660	1150	850	650	420	290	160	
L21	3 to 11	2	2	1/2" dia. bars 18" apart	1750	980	630	440	320	250	160			
L22		2½	2		1960	1100	710	490	360	280	180			
L23		3	2		4340	2440	1560	1080	800	610	390	270		
L24		3½	2		4850	2750	1760	1220	900	690	440	310		
L25		4	2		8450	4760	3040	2120	1550	1190	760	530	300	
L26		4½	2			5190	3320	2300	1690	1300	830	580	320	
L27		5	2			7880	5040	3500	2570	1970	1260	880	490	320
L28			5	2	1		8320	5330	3700	2720	2080	1330	930	520
L31	11 to 14	2	3	1/2" dia. bars 18" apart	2570	1450	930	640	470	360	230			
L32		2½	3		2950	1660	1070	740	540	420	270			
L33		3	3		6480	3650	2340	1620	1190	910	580	410		
L34		3½	3		7300	4100	2620	1820	1330	1030	660	460		
L35		4	3			7050	4520	3140	2300	1770	1130	790	440	
L36		4½	3			7820	5000	3470	2550	1950	1250	870	490	
L37		5	3				7540	5220	3840	2940	1880	1300	740	470
L38			5	3	1		8000	5560	4090	3120	2000	1390	780	500

TABLE 2  
Weight of Brick Walls

Thickness of wall (ins.)	WEIGHT OF WALL—Lbs. per ft. run									
	HEIGHT IN FEET									
	2	3	4	5	6	7	8	9	10	20
4½	90	135	180	225	270	315	360	405	450	900
9	180	270	360	450	540	630	720	810	900	1800
13½	270	405	540	675	810	945	1080	1215	1350	2700
18	360	540	720	900	1080	1260	1440	1620	1800	3600
22½	450	675	900	1125	1350	1575	1800	2025	2250	4500

## Condition 5.

"Roof rafters resting on lintel," or on brickwork above a lintel.

Allow for an additional load per ft. run of lintel equal to  $L = 30 D$ .

Where L = additional load in lbs. per ft. run.

D = distance from wall to nearest purlin in ft.

## Other Conditions

Where a concentrated load, such as a roof truss or a main beam, rests on a lintel, the equivalent uniformly distributed load should be calculated and added to the other loads which are carried by the lintel.

## Shape of Lintels

Lintels can be made without difficulty in any shape, and the underside rebated to suit any type of window frame.

## Pre-Cast Lintels

When lintels are made on the ground in moulds the top side should be very distinctly marked, in order to avoid risk of subsequently handling or placing them wrong way up.

## Reinforced Brickwork

The difference in strength between plain brickwork and reinforced brickwork is as great as, if not greater than, that between plain and reinforced concrete.

A reinforced brick wall will withstand horizontal pressure from either side, such as that of wind or of material piled against the wall, and will also act as a vertical beam carrying its own weight from pier to pier.

B.R.C. Brick Wall Reinforcement consists of steel wire mesh, which lies flat and can be used without having to increase the thickness of the mortar joint. For 4½ in. walls the mesh consists of two strands of wire three inches apart with cross wires welded to them at intervals of 12 inches; for 9 in. walls, two strands of wire six inches apart, and cross wires at 12 in. intervals.

Walls should be built with cement mortar and the reinforcement is put in every fourth, third, or second course, or every course depending on the length of wall and whether it is an outside wall or partition wall.

(Continued on next page)



## FLOOR SLABS

## Design of Floors

In designing ordinary floors it is the custom to assume that the floor may have to carry a certain evenly distributed load, depending in amount on the purpose for which the floor is to be used. It is seldom that such evenly distributed loading actually does occur, except in the case of warehouse buildings, where goods are piled in a regular manner, but it is impossible to gauge exactly how a floor will be loaded, and the assumption of an evenly distributed load, sufficient to provide for unusual loads (such as, for instance, when a room in a dwelling-house or office building may become crowded with people) is a rational treatment, and at the same time simplifies the design.

In cases such as those floors required to carry heavy machinery, large safes, and the like, special designs are necessary.

## Weight of Floor Itself

In addition to the superimposed loads it should be remembered that the weight of the floor itself must be taken into account. Reckoning the weight of reinforced concrete at 150 lbs. per cubic foot, allow  $12\frac{1}{2}$  lbs. for each  $\frac{1}{2}$ -in. thickness of floor, thus 4-in. slab = 50 lbs.

## Floor Thickness

Where the thickness of floor is not already determined by other considerations, the most economical floor to adopt is that in which the concrete and the reinforcement are stressed in proportion to their respective strengths. (See Table 5.)

The thickness of the floor should not be less than one-thirtieth of the span.

## Evenly Distributed Loads

The evenly distributed loads to be provided for, as mentioned above, are in certain cities specified by Local Building Authorities, and they vary somewhat. The following are typical:—

TABLE 4

Class of Building	Loads on Floor in Lbs. per Ft. Super			
	Melbourne (1923)	Sydney (1917)	Adelaide (1923)	London (1916)
Domestic Buildings . . . . .	70	50	50	70
Office Buildings . . . . .	84	60	60	100
Buildings for Public Assembly .	140	100	100	112
Workshop or Retail Shop . . .	140	100	100	112
Ordinary Warehouses . . . . .	168	150	150	224
Flat Roofs . . . . .	70	120	120	—

For continuation of this Table for Dead Loads, see page 31.

## TABLES

The following tables have been prepared for B.R.C. reinforcements. The formulae used in the calculations have been recommended in the Report of the Joint Committees on Reinforced Concrete.

The working stresses are as follows:—

	lbs. per square inch.
Concrete in compression in beams . .	600
Concrete in compression in columns . .	600
Concrete in shear beams . . . . .	65

	lbs. per square inch.
Adhesion of concrete to steel . . . . .	100
Steel rods and bars in tension . . . . .	16,000
Steel wire in tension . . . . .	20,000
Ratio of Co-efficient of Elasticity of steel to that of concrete . . . . .	15

The concrete allowed for is composed of a 4—2—1 mix of broken stone, sand and cement.

TABLE 5

Reference No. for Fabric	Thickness of Concrete (ins.)	Approx. Wt of Floor per sq. ft. (lbs.)	SAFE LOADS—UNIFORMLY DISTRIBUTED—LBS. PER FOOT SUPER.											
			SPAN IN FEET											
			3	4	5	6	7	8	9	10	11	12	13	14
1	8½	106	6694	3714	2337	1594	1144	850	649	506	399	319	256	206
2	8½	106	6444	3584	2254	1534	1099	817	622	484	382	304	244	195
3	8½	106	5994	3274	2054	1394	994	737	550	434	340	269	214	169
4	8½	106	5094	2819	1769	1194	850	625	472	362	281	219	171	133
4	8	100	4820	2660	1670	1129	802	590	446	342	265	207	162	126
5	7½	94	3856	2126	1326	891	631	461	344	261	199	152	116	87
5	7	88	3502	1932	1202	810	582	417	311	235	179	136	103	77
6	6½	81	2779	1524	947	634	444	321	236	176	131	97	71	50
6	6	75	2495	1370	850	567	399	287	211	156	116	85	62	41
7	5½	69	1887	1031	636	421	291	206	138	107	76	53	35	
7	5	63	1657	904	557	367	253	179	128	92	65	44		
8	4½	56	1262	685	418	273	186	129	90	62	42			
9	4	50	880	473	285	182	121	81	53	34				
10	3½	44	612	326	192	120	77	49	29					
11	3	38	408	212	123	73	44	25						
12	2½	31	255	130	72	41	22							

Concrete and Reinforcement Proportioned for Maximum Economy.

**Floor Slabs.**—Continuous or with ends fixed. Reinforced with B.R.C. Fabric. The weight of the floor itself has been deducted, and no allowance is necessary in respect thereof.

For loads to the left of the heavy line, B.R.C. Stirrups must be used to resist Shearing Stresses. For Safe Loads on Slabs with ends "Freely Supported" take two-thirds of above loads, and deduct one-third weight of floor.



TABLE 6

CONCRETE 3 in. THICK

Reference No. for Fabric	Safe Loads—Uniformly Distributed—Lbs. per Ft. Super.									
	SPAN IN FEET									
	3	4	5	6	7	8	9	10	11	12
1	842	457	278	182	124	86	60	41	28	
2	792	430	262	170	115	79	55	37		
3	762	412	250	162	109	75	51	34		
4	727	392	237	153	102	70	47	31		
5	692	372	225	145	96	65	43	28		
6	652	350	210	135	89	60	39	24		
7	612	327	196	125	82	53	34			
8	577	308	183	115	75	48	30			
9	530	292	166	104	66	52	25			
10	490	259	152	94	59	36				
11	408	212	123	73	44	25				
12	341	175	99	57	34					
13	273	137	74	40	19					
14	220	107	55	26						

Tables 6 to 12 (inclusive) are for Floor Slabs of 3 in., 3½ in., 4 in., 4½ in., 5 in., 5½ in., and 6 in. thickness respectively:—

Continuous, or with ends fixed. Reinforced with B.R.C. Fabric. The weight of the floor itself has been deducted, and no allowance is necessary in respect thereof.

For Safe Loads on Slabs with ends "Freely Supported" take two-thirds of above loads and deduct one-third weight of floor.

TABLE 7

CONCRETE 3½ in. THICK

Reference No. for Fabric	Safe Loads—Uniformly Distributed—Lbs. per Ft. Super.									
	SPAN IN FEET									
	3	4	5	6	7	8	9	10	11	12
1	1181	646	396	262	181	128	92	66	47	33
2	1126	616	278	249	171	121	86	61	43	29
3	1086	591	363	238	164	115	82	58	40	27
4	1026	564	346	226	155	108	76	53	36	
5	986	536	326	213	145	101	70	49	32	
6	926	501	304	198	134	92	64	43	28	
7	856	461	279	180	121	82	56	37		
8	804	432	261	168	111	75	50	32		
9	734	392	236	150	99	65	42	26		
10	612	326	192	120	77	49	29			
11	521	274	160	97	60	35	19			
12	431	222	127	75	43	23				
13	350	177	98	54	28					
14	268	132	68	34						

TABLE 8

CONCRETE 4 in. THICK

Reference No. for Fabric	Safe Loads—Uniformly Distributed—Lbs. per Ft. Super.									
	SPAN IN FEET									
	4	5	6	7	8	9	10	11	12	13
1	864	535	356	249	179	131	96	71	52	37
2	825	510	339	236	169	123	90	66	47	33
3	790	489	324	225	160	116	85	61	43	30
4	750	464	306	212	150	109	78	56	39	
5	720	443	292	201	142	102	73	52	35	
6	675	407	268	184	129	91	64	44	29	
7	620	377	246	168	117	82	58	38		
8	570	346	225	152	105	72	49	32		
9	473	285	182	121	81	53	34	19		
10	395	234	148	95	61	38	21			
11	331	194	119	74	45	25				
12	268	153	91	54	29					
13	212	118	66	35						
14	172	92	48							

TABLE 9

CONCRETE 4½ in. THICK

Reference No. for Fabric	Safe Loads—Uniformly Distributed—Lbs. per Ft. Super.									
	SPAN IN FEET									
	4	5	6	7	8	9	10	11	12	13
1	1114	692	464	326	236	175	131	99	74	54
2	1064	662	442	310	224	165	123	92	69	50
3	1022	634	424	296	213	157	116	86	64	46
4	956	593	394	275	198	144	106	78	56	40
5	856	559	371	258	186	134	98	71	51	35
6	833	512	339	234	164	119	86	61	43	28
7	789	485	322	220	156	111	79	56	38	
8	685	418	273	186	129	90	62	42	26	
9	556	336	216	144	97	65	42	25		
10	462	275	174	113	73	46	27			
11	387	228	141	89	55	31				
12	324	187	113	68	39					
13	272	154	89	51	26					
14	230	128	72	38						

TABLE 10

CONCRETE 5 in. THICK

Reference No. for Fabric	Safe Loads—Uniformly Distributed—Lbs. per Ft. Super.									
	SPAN IN FEET									
	5	6	7	8	9	10	11	12	13	14
1	862	579	409	298	222	168	128	97	74	55
2	817	549	387	281	209	157	119	90	67	49
3	782	524	367	267	198	149	112	84	62	45
4	740	490	346	250	185	138	102	76	56	39
5	687	457	319	230	168	124	92	67	48	33
6	652	434	302	217	158	116	85	61	43	28
7	557	367	253	179	128	92	65	44	29	
8	469	307	209	145	101	70	47	29		
9	390	252	168	114	77	50	31			
10	321	203	133	87	55	33				
11	269	167	106	66	39	20				
12	216	121	79	46	23					
13	181	113	62	32						
14	129	70	35							

(Continued on next page)



TABLE 11  
CONCRETE 5½ in. THICK

Reference No. for Fabric	Safe Loads—Uniformly Distributed—Lbs. per Ft. Super.									
	SPAN IN FEET									
	5	6	7	8	9	10	11	12	13	14
1	1036	701	496	363	273	207	159	123	95	72
2	991	671	473	346	259	197	151	116	88	67
3	939	631	446	325	242	183	139	106	80	60
4	886	594	417	303	225	169	128	96	72	52
5	831	556	391	283	209	156	117	87	64	46
6	754	503	351	253	185	137	101	74	53	36
7	636	421	291	206	138	107	76	53	35	21
8	539	353	241	168	118	83	56	36	21	
9	451	293	206	135	92	61	38	21		
10	356	233	162	101	65	39	21			
11	299	187	119	75	44	23				
12	256	157	97	58	31					
13	192	112	64	32						
14										

TABLE 12  
CONCRETE 6 in. THICK

Reference No. for Fabric	Safe Loads—Uniformly Distributed—Lbs. per Ft. Super.									
	SPAN IN FEET									
	5	6	7	8	9	10	11	12	13	14
1	1235	833	593	436	329	251	195	152	118	92
2	1165	786	558	410	308	235	181	140	105	83
3	1105	742	525	385	288	219	168	129	99	75
4	1035	695	490	358	267	202	154	117	89	66
5	980	659	465	338	248	189	143	109	81	60
6	850	567	399	287	211	156	116	85	62	41
7	705	466	323	230	166	120	86	60	40	24
8	599	393	269	185	133	93	64	42	25	
9	480	310	208	141	96	63	39	21		
10	401	255	168	111	72	44	23			
11	335	209	134	85	51	27				
12	295	181	114	69	39					
13	228	136	43							
14										

TABLE 13  
STANDARD LOADINGS, OTHER CONDITIONS VARIED

70 lbs. per sq. ft. Span in Feet.						84 lbs. per sq. ft. Span in Feet.						112 lbs. per sq. ft. Span in Feet.						140 lbs. per sq. ft. Span in Feet.						168 lbs. per sq. ft. Span in Feet.						
Thick- ness, &c. Slab (ins.)	6	7	8	10	12	Thick- ness, &c. Slab (ins.)	6	7	8	10	12	Thick- ness, &c. Slab (ins.)	6	7	8	10	12	Thick- ness, &c. Slab (ins.)	6	7	8	10	12	Thick- ness, &c. Slab (ins.)	6	7	8	10	12	
	No.	No.	No.	No.	No.		No.	No.	No.	No.	No.		No.	No.	No.	No.	No.		No.	No.	No.	No.	No.		No.	No.	No.	No.	No.	
3	10 9					3						3½	9 7						4½	11 10 8	9 8 6				4½	10 9 7				
3½	12 11 9		9 7			3½	11 10 9		8 7			4	11 10 8		8 6				5	11 10 9	9 8 7	8 7 5			5	11 9 8	9 7 6	8 6 4		
4	13 11 10	11 10 8		8 6		4	12 11 9	10 9 8		7 6		4½	11 10 9	10 9 7		7 6			5½	12 11 9	10 9 7	9 7 6		3	5½	11 10 9	9 8 7	8 6 5		
4½	13 12 11	11 10 9	10 9 7		4	4½	13 12 10	11 10 8	9 8 6			5	12 11 9	10 9 8	9 8 6				6	12 11 10	10 9 8	9 8 6	5 3		6	12 11 9	10 9 7	8 7 5		3
5	13 13 11	12 11 9	10 9 7	6 5		5	13 12 11	11 10 9	10 9 7	6 4		5½	13 11 10	11 9 8	9 7 6		5 4		6½	12 12 10	11 10 8	9 8 6	6 5 4		6½	12 11 9	10 9 7	9 7 6	5 3	
5½	14 13 12	12 11 10	11 10 8	8 5	3	5½	13 13 11	12 11 9	10 8 5	3 6 5		6	13 12 10	11 10 9	10 8 7	7 6 4			7	12 12 10	11 10 9	10 9 7	7 6 4	1	7	12 12 10	11 10 8	9 8 6	6 3	
6	14 14 12	13 12 10	11 10 9	9 6	5 3	6	14 13 12	12 11 10	11 9 8	8 7 5	3	6½	13 12 11	12 10 9	10 8 7	7 6 5	2		7½	13 13 11	12 11 9	10 9 7	7 6 4	4 2	7½	13 12 10	11 10 8	9 7 4	7 5 1	

## Stresses Adopted

Concrete—600 lbs. per sq. in., for 1:2:4 mix.

Steel—Top Row—25,000 lbs. per sq. in.

Middle Row—25,000 lbs. per sq. in.

Bottom Row—16,000 lbs. per sq. in.

These tables have been calculated on  $\frac{W.L.^2}{10}$  and fabric 3 in. from bottom of slab.

For end spans, take 1 ref. No. heavier.

For single spans, take 2 ref. Nos. heavier.

No allowance need be made for dead weight of slabs.

For spans intermediate to those listed, take mean of reference numbers, for adjacent spans, next heavier ref. No. if fractional.

## Example

A single span floor 5 in. thick is required to carry 1 cwt. added load on a span of 7 ft., using a stress of 25,000 lbs. per sq. in. on fabric. It is seen that No. 10 B.R.C. would be required if the slab were continuous at both ends. For an end span use No. 9 B.R.C., and for the present single span use No. 8 B.R.C.

(Continued on next page)



## BEAMS

## Rectangular and T Beams

Reinforced concrete beams are, as a rule, either rectangular or "T" shaped.

Rectangular beams occur in the form of Crane Girders, Wall Girders, Lintels and the like. They are extremely useful as heavy wall girders, the concrete forming portion of the wall.

"T" beams are used in all cases where a concrete surface is required to be supported by a beam. The flange on top of the "T" is formed by the concrete surface and the steel reinforcement is embedded near the bottom of a projecting concrete rib. The commonest case is that of a floor slab supported by beams at intervals. The concrete of the floor slab forms the compression flange and a monolithic construction is thereby obtained.

## Design of T Beams

The design of "T" beams, influenced by many conditions such as loading, span, beam spacing, etc., cannot be presented in detail by tables, as in the case of slabs.

Some index of determining the approximate size and shape of "T" beams is sometimes useful in the preliminary stages of design.

The following formula applies to "T" beams having loads uniformly distributed, and determines the cross sectional area only:—

$$\frac{W}{2} \times \frac{1}{90} = bd.$$

Where W = Total uniformly distributed load on the beam in lbs.

bd. = cross sectional area of the beam in sq. ins.

b. = width of rib.

d. = depth of rib from top of slab to centre of steel.

The ratio of "b" to "d" should be as 1:1½ or 1:2½ unless governed by other conditions.

Also "d" should not be less than 1-15th of the span and "b" not less than 6 ins.

e.g.  $W = 17,280 \text{ lbs.}$   
 then  $\frac{17280}{2 \times 90} = 96 \text{ sq. ins.}$

let b = 8 ins.

then d = 12 ins. plus 2 ins. for cover to reinforcement.

Approximate size = 14 ins. x 8 ins.

Specify all beams to be reinforced with B.R.C. standard units, which provide effective tension and sheer reinforcement.

## B.R.C. Standard Beam Units

Designed by our engineers to suit each particular set of conditions, B.R.C. Beam Units reduce error from the personal factor in reinforced concrete construction. Each unit consists of mild steel rods securely held in correct alignment and position by plain or grouped (fabric) stirrups with all rods bent, lapped and terminated at their correct positions.

## Grouped or Fabric Stirrups

The provision of efficient resistance to shearing stresses is absolutely essential to the security of the beams. The B.R.C. system of Grouped Stirrups, besides being easier to manipulate and more rigid than any other, give a more intimate connection between the reinforcement and the concrete and a more regular and uniform distribution of stress.

It is less liable to be wrongly placed, less liable to displacement, and is a type that we have been able to standardise. The stirrup groups are standard-

ised in lengths of 2 ft. each, so that on a bar, say 14 ft. long, there are seven stirrup groups, each one placed close up to the next.

B.R.C. Grouped Stirrups are made from B.R.C. Fabric, and the reference numbers in the stirrup table indicate the reference numbers of the Fabrics from which they are made.

TABLE 4  
(Continued from Page 28)

## Dead Weights of Floors, Ceilings and Walls

	Weight in lbs. per sq. ft.
<b>FLOORS</b>	
¾ in. Hardwood floor on 3 in. x 2 in. hardwood joists at 18 in. centres	6
Cinder concrete filling per inch of thickness	7
Cement finish per inch of thickness	12
<b>CEILINGS</b>	
Plaster on tile or concrete	5
Suspended metal lath and plaster	10
<b>PARTITIONS</b>	
3-in. Clay tile	17
4-in. Clay tile	18
6-in. Clay tile	25
3-in. Gypsum block	10
4-in. Gypsum block	12
5-in. Gypsum block	14
6-in. Gypsum block	16

For plaster partitions, add 5 lbs. per sq. foot of plaster area.

TABLE 14

## Strength of Standard B.R.C. Grouped Stirrups

Ref. No. of Stirrups	3	4	5	6	7	8	9	10	11	12	13	14	1210
Area of cross section per ft. length (sq. ins.)	.761	.660	.566	.479	.400	.338	.282	.232	.195	.161	.130	.103	.026
Safe Working Tensile Strength of 1 Stirrup per ft. length (lbs.)	12200	10600	9100	7700	6400	5400	4500	3700	3100	2600	2100	1650	400

(Continued on next page.)



## COLUMNS

TABLE 15

COLUMNS—with ends fixed—centrally loaded. Reinforced with Round Steel Bars and B.R.C. Hoops and Helical Wrappings. (not otherwise applicable.)

Reference No.	No. of Bars.	D (ins.)	d (ins.)	Diam. of Bars (ins.)	SAFE LOADS—TONS					
					Length of Column (feet)					
					10	14	18	22	26	30
C41	4	10	7	3/8	17	16	14	12		
C42					19	18	16	14		
C43					22	20	18	16		
C44	4	11	8	1/2	23	22	20	18	16	
C45					26	24	22	20	18	
C46					28	26	24	22	20	
C47	4	12	9	5/8	28	26	24	22	20	
C48					30	28	26	24	22	
C49					33	31	29	27	25	
C410	4	13	10	3/4	35	33	31	29	27	25
C411					38	36	34	32	30	28
C412					41	39	37	35	33	31
C413	4	14	11	7/8	41	39	37	35	33	31
C414					44	42	40	38	36	34
C415					47	45	43	41	39	37
C416	4	15	12	1	50	48	46	44	42	40
C417					53	51	49	47	45	43
C418					57	55	53	51	49	47
C419	4	16	13	1 1/8	57	55	53	51	49	47
C420					60	58	56	54	52	50
C421					63	61	59	57	55	53
C422	4	17	14	1 1/4	64	62	60	58	56	54
C423					67	65	63	61	59	57
C424					70	68	66	64	62	60
C81	8	14	11	1	56	54	52	49	46	43
C82		15	12	1	62	60	57	54	51	48
C83		16	13	1	69	67	65	62	59	56
C84		17	14	1	78	78	75	72	69	66
C85		18	15	1	86	86	83	80	77	74
C86		19	16	1	95	95	93	90	87	83
C87		20	17	1	106	106	103	100	97	93
C88		21	18	1	116	116	116	116	110	104
C89		22	19	1	127	127	127	127	121	114
C810		23	20	1	138	138	138	138	132	125
C811		24	21	1	150	150	150	150	150	150
C812		25	22	1	161	161	161	161	161	161
C813		26	23	1	174	174	174	174	174	174
C814		27	24	1	188	188	188	188	188	188

For columns with one end free take  $\frac{3}{4}$  of the above loads.  
For columns with both ends free take  $\frac{3}{5}$  of the above loads.

## Columns

Reinforced Concrete Columns are more fire-resisting than columns of other material. They are commonly square in section, but may be made rectangular, polygonal or circular, as required; corners of square columns may be bevelled.

## Reinforcement

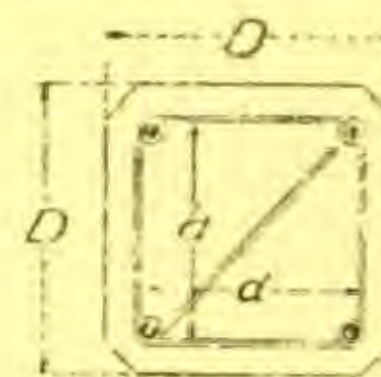
The concrete is reinforced with vertical rods encircled at intervals by wire hoops or ligatures and wrappings. The safe compressive load on the concrete is 600 lbs. per sq. in., and on the steel 9,000 lbs. per sq. in., the latter being always 15 times the former, owing to the relative elasticities of the materials.

The provision of efficient resistance to spreading of the bars and bulging of the concrete is absolutely essential to the security of the columns. Columns may have higher safe loads, depending on the mix of the concrete and the nature and amount of the wrapping.

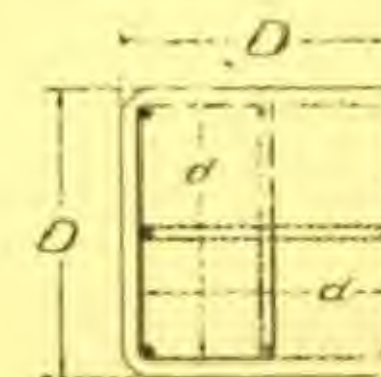
## Hoops and Helical Wrappings

Hoops are used to encircle the bars and hold them in their correct position, ensuring that the core be of the proper shape and size.

B.R.C. Helical Wrappings may be made for special shape or arrangement of bars. Each wrapping is so designed that the top end is bent inwards to extend well across the concrete core, and the lower end is similarly dealt with.



For cross-section of Column refer to Column Table



For cross-section of Column refer to Column Table

When the column is complete the sections constitute one long helical wrapping from top to bottom. The pitch of the helical is determined by the load which the column is required to carry.

B.R.C. Hoops and Helicals are the most perfect form of binding.

## Eccentric Loading

End columns are more heavily stressed than intermediate columns, the latter having a central load equal in amount whilst end columns have beams connected on one side only, which act more or less eccentrically. It will be generally correct to design it as a column carrying a safe central load one-third greater than the above-mentioned eccentric load.

## FOUNDATIONS

## Reinforced Concrete Foundations

Reinforced concrete is well adapted to the construction of foundations. As compared with plain concrete, its advantages for special footings are a reduction in the amount of excavation required, a saving in material and a reduction in the weight of the foundation itself. It is suitable both for wall foundations and column foundation.

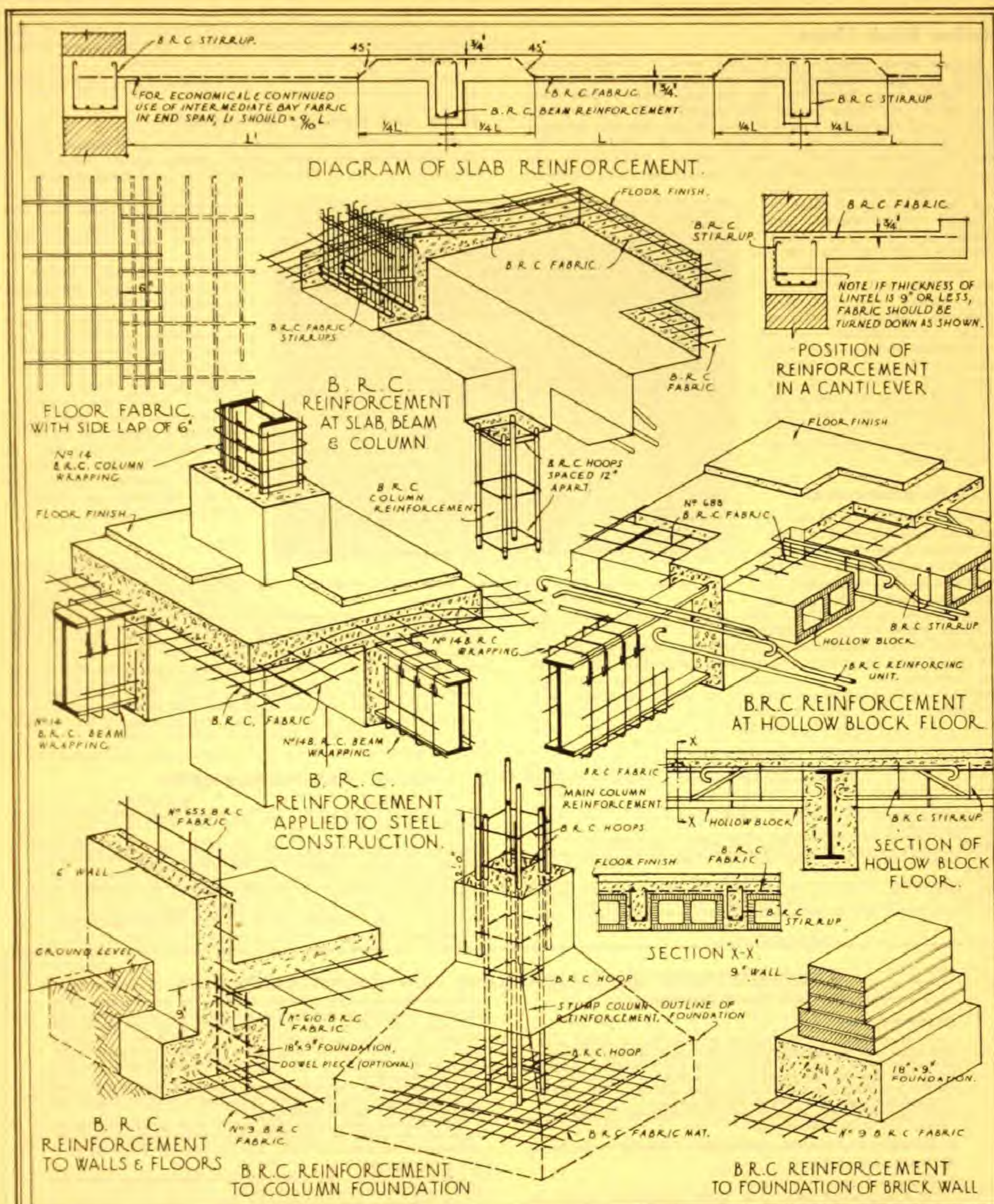
## Footing Reinforcements

The simplest form of reinforcement for wall footings is B.R.C. mesh supplied in rolls cut slightly less than the width of footings. No. 9 fabric is recommended. Sheets of fabric can also be used in light column footings.

Heavy column footing reinforcement can be supplied by us and delivered to the job in the form of units or grids.

(Continued on next page)





## APPLICATIONS OF THE B.R.C. SYSTEM OF REINFORCED CONCRETE CONSTRUCTION

DRAWING  
No 1.  
27<sup>TH</sup> JAN. 31.



## Hollow Block Floors

Hollow block construction is now used to a considerable extent in light buildings such as apartments and offices. The blocks may be either the one-way type or the two-way type. No cross beams are employed in the one-way type, except the small ribs of the floor slab formed between the rows of hollow blocks or tiles; in the two-way type, cross beams are placed at the columns. The blocks are placed directly upon the forms with the reinforcement in the spaces between them, and the concrete is filled in between the blocks and poured over the top to form the floor—the ribs thus form a series of comparatively light "T"-beams side by side with flanges (i.e., the floor thickness) usually 2 or more inches in thickness. B.R.C. reinforcing units used in this type of "T" beam, with B.R.C. electrically-welded mesh No. 688 manufactured especially for reinforcing the floor slab, ensures a highly satisfactory floor system of hollow block construction.

## Wall Reinforcements

The two principal types of concrete wall construction are the "bearing wall" type, as in concrete residences and the "curtain wall" type, which is generally used to fill in the panels between the girder and column, which form the skeleton frame of the building.

In both cases reinforcement is a prime necessity, and in the latter type is universally demanded by the City Building Regulations. In most cases where curtain walls are employed with a small percentage of wider openings, it is customary to use both horizontal and vertical reinforcement. B.R.C. Fabric No. 655 provides ideal two-way rein-

ment; an added feature when this reinforcing mesh is used is that the edges of window and door openings are stiffened by bending back the fabric into a U-shape.

External walls should not be less than 6 inches thick and internal walls may be 4 inches.

## Beam and Column Wrappings

B.R.C. beam and column wrappings fabricated of No. 14 electrically-welded mesh have been extensively selected for use in fireproofing structural steel work.

When subject to fire the concrete protection to the steel work, unless properly protected and reinforced, will shatter and crumble off. Vibration is also liable to cause improperly reinforced supports of beams to crack.

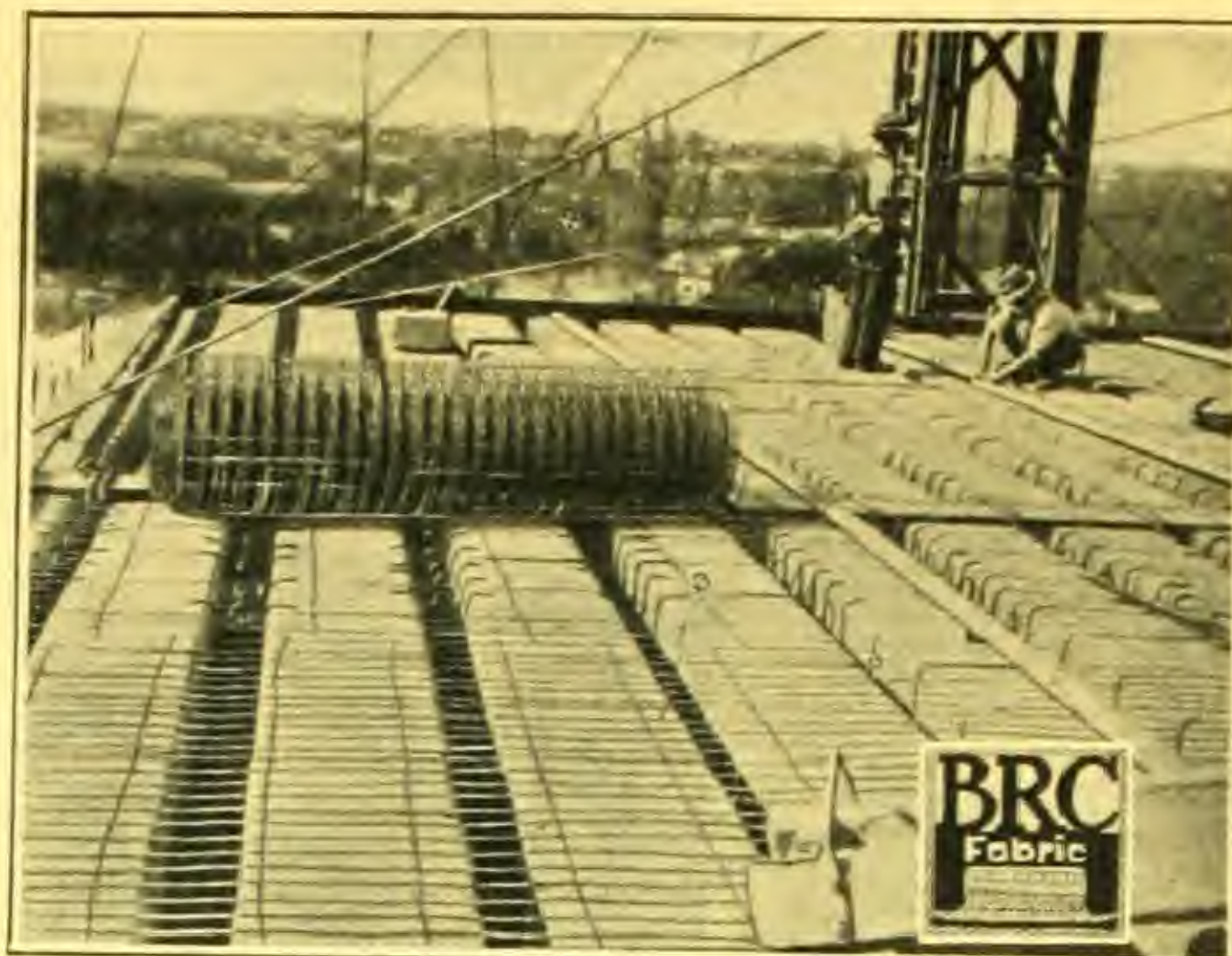
The use of ordinary beam and column wrapping is unsatisfactory, for it does not reach out into the corners, which are the weakest parts. B.R.C. electrically-welded wrappings are pre-shaped to fit and stand out from the steel work, and may be confidently relied on to eliminate all possibility of slipping from position or coming apart when applied.

## Piles

The advantages of reinforced concrete piles are many: absolute permanency, not being subject to decay or to the attacks of wood borers and destroyers; economy, because of greater carrying capacity; can be cut short or lengthened to suit the case after driving has commenced. The tops of B.R.C. piles are in no way damaged by being driven.

There are three standard shapes:—Square, octagonal and sheet piles. They are formed of rods encircled with B.R.C. Sectionised Helical Wrappings and hoops. They are made from 25 to 45 feet long and are fitted with cast iron or steel shoes.

Piles constructed with our B.R.C. reinforcements are stronger than any other form of reinforced concrete pile.



Hollow Block Floor Reinforced with B.R.C. Fabric  
Adelaide Railway Station.

## RECOMMENDED SIZES OF B.R.C. FABRIC REINFORCEMENT

Position.	Reinforcement.
Wall foundations under brick or concrete walls	No. 9 B.R.C. fabric
Lintels	B.R.C. unit No. .... (see Table 4).
Hearth slabs, 3 in. or 4 in. thick	No. 610 B.R.C. fabric (on filling)
Floor slabs, 3 in. or 4 in. thick	No. 610 B.R.C. fabric (on natural ground). No. 655 B.R.C. fabric (on filled ground). No. .... B.R.C. fabric (for suspended floor). (See Table 6 et seq.)

Position.	Reinforcement.
Hollow block floor slab (min. thickness 2 in.)	No. 688 B.R.C. fabric
Internal walls, 4 in. thick	No. 610 B.R.C. fabric (for small areas)
Internal or external walls, 6 in. thick	No. 655 B.R.C. fabric
Rectangular or T beams	B.R.C. standard units (with plain or grouped stirrups)
Structural steel fireproof wrappings	No. 14 B.R.C. fabric wrappings

## RECOMMENDED SPECIFICATIONS FOR ARCHITECTS' USE

### 1. For Domestic and Small Buildings

#### REINFORCEMENT

All reinforcements for lintels, beams, floors, slabs, walls and other reinforced concrete work shall consist of B.R.C. Standard Units and B.R.C. Electrically-welded Fabric, delivered on the job ready for placing in the forms or, in the case of fabric, cut to length (or in rolls) and in accordance with the following schedule:—

NOTE.—Schedule should set out "Position" of member, "Size" and "Reinforcement."

### 2. Reinforced Concrete Buildings (wholly or in part)

#### REINFORCEMENT

#### 1. Materials and Fabrication

(a) Fabric.—All floor and wall reinforcing shall be B.R.C. Electrically-welded Steel Fabric of hard cold-drawn wire, conforming to the British Standard Specification for hard-drawn steel wire, and having an ultimate tensile strength of not less than 80,000 lbs., and an elastic limit of not less than 40,000 lbs., and shall be the gauges and sizes as set out in the Schedule (or, as shown on Drawings, Nos. ....).

(b) Reinforcing Units.—All beams and columns shall be fabricated of mild steel rods conforming to the British and Australian Standard Specification for Structural Steel. All

reinforcements shall be delivered to the site in the form of shop fabricated B.R.C. units consisting of number and diameter of rods as set forth in the design, all bent and clogged to detail (as shown on Drawings, Nos. ....), and accurately spaced and securely held in position by means of B.R.C. plain (or fabric) stirrups secured to rods where necessary.

(c) Beam and Column Wrappings.—All structural steel members shall be wrapped for their entire length by No. 14 B.R.C. fabric wrapping.

(d) Identification.—All rolls, units and other miscellaneous pieces shall be labelled, with strong tags wired on, marked to identify each piece and its position in the work.

#### 2. Workmanship

(a) Cleanliness.—All reinforcing, when placed, shall be free from paint, oil or rust scale.

(b) Placing.—The contractor shall make a particular point of seeing that all parts of the reinforcement are placed correctly in every respect and are temporarily fixed where necessary to prevent displacement before or during the process of tamping and ramming the concrete into space.

(c) Mechanical Bond Overlaps.—All B.R.C. fabric shall be lapped from 3 in. to 6 in. at sides and about 40 diameters of the main wires at ends. At all intersections and laps in the fabric, mechanical bond shall be made by thoroughly lacing its fabric together by wiring.



## ROADS AND PAVING

## Road Reinforcement

B.R.C. Fabric has been largely used, and with great success, to strengthen the concrete roadways and to bridge over the weak spots in the under-bed below. The fabric, being supplied in long rolls of 240 feet, is very easy to lay.

For the heaviest traffic it is usually sufficient to have a thickness of six inches, reinforced with No. 9 B.R.C. Fabric.

For lighter traffic the thickness of concrete may be reduced to five inches, with a lighter gauge of reinforcement, No. 11 or No. 14 Fabric, depending on the class of traffic and the nature of the ground. In view of the changing nature of traffic it is in most cases advisable to anticipate the advent of heavier traffic.

B.R.C. Fabric provides a perfect road foundation, even on weak ground, because it spreads each wheel load over a very large area of the under-bed.



Edgeware Road, Marrickville, N.S.W.

Such floors laid without B.R.C. Fabric almost invariably crack, especially if laid on filling. Cracking may be due to contraction, expansion, unequal settlement, or unequal loading. If the floor is finished with a surface of granolithic, mosaic, asphalt, wood block, stone setts, or other form of paving, the cracking extends to such surface. In some cases it causes serious trouble; in all cases it is unsightly and objectionable. The liability to crack is considerably reduced, and, in most cases, cracking is entirely eliminated by using a layer of B.R.C. Fabric in the concrete.

At the same time the thickness of concrete may be reduced and the floor be more quickly laid—a thickness of 3 inches or 4 inches of concrete is generally sufficient, but more may be required on soft ground. B.R.C. Fabric, Ref. No. 655, is recommended where the floor is built on top of filling, or where the loads are heavy. Ref. No. 610 is recommended where there is no filling and where the subsoil is firm and floor loading is light. Ref. No. 688 is recommended for conditions of soil and load-

ing intermediate between the above conditions or where a job is required slightly stronger than the No. 610 and less costly than the No. 655.

## Floor Paving

Three special sizes of B.R.C. Fabric are made for use in all classes of concrete floors or pavements laid directly on the ground, such as Office and Warehouse Basements, Workshop and Shed Floors, Platforms, Slopes and Embankments, Garages and Yards, Promenades and Footpaths.

## Notes on Construction, for Complete Reinforced Concrete Road

Six inches thick concrete reinforced with No. 9 B.R.C. Fabric will spread any wheel load over an area of at least 10 sq. ft. of ground.

A side slope of 1 in 50 gives an agreeable running surface.

Where filling is necessary, the ground should be filled in layers of about six inches. This gives the best results.

A light roller will often give sufficient consolidation where the reinforced construction is to be used.

Drainage is of the utmost importance. It should be obtained through side ditches at least 18 inches deep and filled up with rubble.

Concrete should consist by volume of:—

Four parts of good, hard, broken stone (1½ in. to ½ in.);

One and a half parts of fine aggregate (½ in. down to sand);

One part of Portland cement.

Proportions are based on 40 per cent. voids.

Transverse joints are a source of weakness and are not required. Where work is left overnight it should be finished with a straight vertical edge across the road and an extra strip of reinforcement three feet wide should be inserted about two inches below the top of the concrete, half the width being built into the day's work, leaving 18 inches projecting to bond into the next day's work.

When a road is laid in two halves (to leave one side open for traffic) the longitudinal joint along the middle of the road should be finished against a board with a straight vertical edge, without any reinforcement projecting. The second half of the road should be finished tight up against the first half—any friable edges should be cut back to the solid.

Thoroughly soak the ground before laying the concrete.

Concrete should be mixed as dry as possible, so long as a workable mixture is obtained. Excess of water decreases the strength of the concrete.

The surface should be struck off with a wooden template. Finish, from a bridge across the road, with a wooden float—a metal float must not be used—smooth, plaster-like finish brings fine material to the top, which will flake off under traffic.

It is an advantage to squeeze the excess water out of the concrete by rolling. Use a hollow roller about 5 ft. long by 8 in. in diameter, made from sheet steel and weight about 80 lbs. Follow up with a rubber or canvas belt drawn across the surface of the concrete with a slight forward motion.

Protect finished concrete overnight with tarpaulin; next day cover with about two inches of sand or loam, kept wet for a fortnight. This is absolutely necessary to secure a good wearing surface. Leave for about three weeks before opening to traffic.

## Notes on Reinforced Concrete Footpath Construction

Concrete should be two inches thick, reinforced with No. 14 B.R.C. Fabric, laid either longitudinally or transversely half an inch below the top of the concrete.

The ground to receive the concrete should be graded to the shape of the finished footpath.

Concrete should consist of three parts coarse aggregate, one and a half parts fine aggregate, and one part of cement.

Concrete should be first laid in small (3 ft. long) alternate sections—when set return and relay remaining sections.

A hard-wearing surface can be obtained by finishing and curing similar to reinforced concrete road construction.

## Tennis Courts

Concrete tennis courts can be laid to give every satisfaction by laying about 4 inches of reinforced concrete on a layer of sand, or clinkers after the subsoil has been properly prepared, drained, graded and consolidated.

We recommend that the concrete be reinforced with either No. 610 B.R.C., or No. 13 B.R.C. fabric. In cases where a slightly heavier reinforcement is required, we recommend No. 688. The glare of the light on the concrete can be considerably relieved by incorporating suitable colouring pigments in the upper layer of the concrete.



5f	<b>D. &amp; W. CHANDLER LTD.</b>		"KANGAROO"
	<i>The Biggest Hardware House in Victoria</i>		
	234-236 FLINDERS LANE, MELBOURNE F 4175 (4 lines)	276-294 BRUNSWICK STREET, FITZROY J 4145 (7 lines)	
S.A.A. File No.	And At Armstrong Street, BALLARAT Lava Street, WARRNAMBOOL	Hargreaves Street, BENDIGO Pynsent Street, HORSHAM	

[For Other Products, See Pages 76, 120, 175, 250, and 482]

### "LUGSTEEL" BRICKWORK REINFORCEMENT

(Patented throughout Australia). Patent No. 22377/29.

"Lugsteel" Brickwork Reinforcement gives to brickwork, properties similar to reinforced concrete. The lugs, by mechanical bond, transmit stresses from the brickwork to the steel, giving the brickwork strength, as a beam. This reinforcement, by its effective mechanical bond, will prevent cracking of brick walls built on ground of varying bearing capacity.

#### Uses of "Lugsteel" Brickwork Reinforcement

Reinforced brickwork foundation walls.  
External and internal lintels.  
Lintels and binding courses at top of series of openings.  
Carrying walls in place of steel joists.  
Carrying suspended brick floors.  
Brickwork cantilevers.  
General brickwork reinforcement against cracking or settlement.

#### Design

The Loading Tables, set out below, apply to the usual cases met in brickwork construction. We shall be pleased to design and advise for more complicated construction.

The weight of  $4\frac{1}{2}$  in. thick brickwork in lbs. actually carried over an opening can be obtained by multiplying the width of the opening in feet by itself and then by fourteen.

#### Example—

6 ft. span — Weight carried.  
6 ft. x 6 ft. x 14 = 504 lbs.



Actual Photo of Section of "Lugsteel" Brickwork Reinforcement.

#### Melbourne University Tests

Abstract of Report on built-up brick beam tested at the University of Melbourne, January 13, 1930:

A built-up brick beam, suitably reinforced for shear and tension by a special steel strap placed along the bottom of the beam, with the projections upward between the bricks, were provided. The beam was tested on a six feet span. The beam was  $4\frac{1}{2}$  in. wide (one brick) and 9 in. deep, the bricks being placed vertically with no bonding beyond the mortar joints. The beam was 14 days old. The central load was distributed over a distance of 9 in. each side of the centre by a timber beam 6 in. wide and 3 in. deep. Maximum load sustained was 5,644 lbs.

(Signed) R. R. BLACKWOOD (Testing Officer) for Professor of Engineering.

This load is equivalent to a uniformly distributed load of about 10,000 lbs.

### ARCHITECT'S SPECIFICATION

#### BRICKWORK REINFORCEMENT

Unless otherwise specified—all brickwork reinforcement forming lintels to external and internal door, window, or other openings, also all reinforcement to (state location, etc.) shall be "Lugsteel" Brickwork Reinforcement of standard units in conformity with the Manufacturer's Loading Tables (or of the gauges and sizes as set forth in the following schedule):—

**Note.**—The following clauses should be used to ensure the accurate building-in and development of the full strength of the reinforcing units.

**BRICKS.**—All bricks shall be sound, hard, and well burnt, preferably machine-made.

**MORTAR.**—All mortar shall be composed of one part by volume of Portland cement to not more than three parts by volume of good, clean sand. Mortar shall be used immediately after mixing.

**BRICKWORK.**—All bricks shall be well wetted, all joints filled, and all bricks bedded solid. (Any plugs near reinforcement should be built in, rather than driven in later.)

**LINTEL SOFFITS.**—On temporary support of rough boarding, lay half an inch of mortar; place reinforcement on mortar, lugs upwards; lay coat of mortar on reinforcement and then lay bricks.

(The cover mortar keys through the holes in the reinforcement with the mortar above and protects the steel. After hardening of mortar, the board can be dropped). Finish the soffit with a thin render coat.

**PAINTING.**—When the reinforcement is used internally for large openings and is not covered with rendering or plaster, the exposed portion shall be cleaned free from rust and two coats of approved brand steel-protecting paint applied.

#### Loading Tables

Sound Machine-Made Bricks. Three to One Cement Mortar.  
Soldier Brick. Total distributed load in lbs. on span of  
9 in. deep.  $4\frac{1}{2}$  in. wide. 4 ft. 6 ft. 8 ft. 10 ft. 12 ft.

Gauge.	Width.	4 ft.	6 ft.	8 ft.	10 ft.	12 ft.
14	$3\frac{1}{2}$ in.	3,500	2,320	1,750	1,400	1,160
14	3 in.	2,670	1,780	1,335	1,070	
16	$3\frac{1}{2}$ in.	2,900	1,820	1,450	1,150	
16	3 in.	2,230	1,480	1,115		

Soldier Brick. Total distributed load in lbs. on span of  
13 in. deep.  $4\frac{1}{2}$  in. wide. 4 ft. 6 ft. 8 ft. 10 ft. 12 ft.

Gauge.	Width.	4 ft.	6 ft.	8 ft.	10 ft.	12 ft.
12	$3\frac{1}{2}$ in.	6,840	4,550	3,420	2,700	2,275
12	3 in.	5,000	3,340	2,500	2,000	1,670
14	3 in.	4,000	2,670	2,000	1,600	1,335
16	3 in.	3,320	2,230	1,660	1,300	1,115

Stretcher Bond. Total distributed load in lbs. on span of  
13 in. deep.  $4\frac{1}{2}$  in. wide. 3 ft. 4 ft. 6 ft.

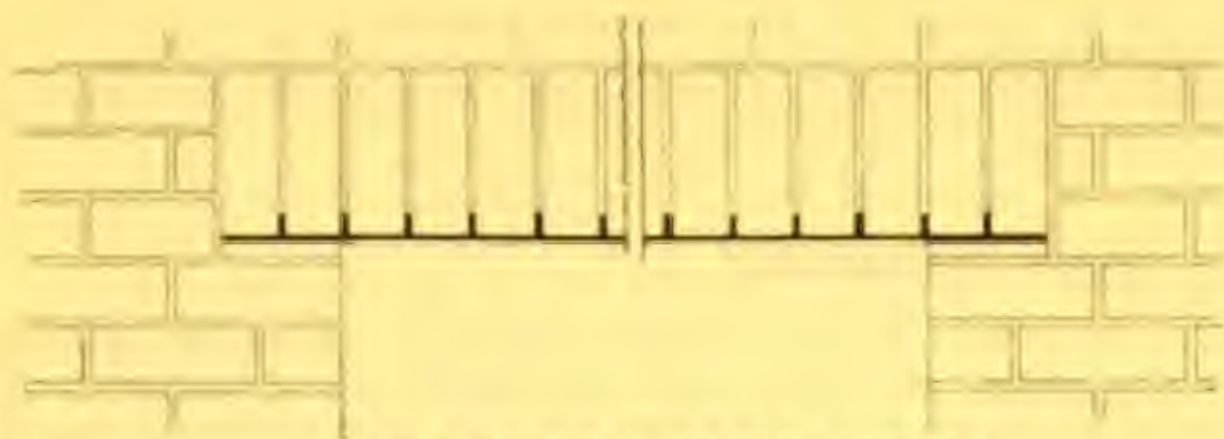
Gauge.	Width.	3 ft.	4 ft.	6 ft.
14	$3\frac{1}{2}$ in.	2,320	1,800	1,160
14	3 in.	1,800	1,400	900
16	$3\frac{1}{2}$ in.	1,820	1,450	910
16	3 in.	1,480	1,150	740

#### $4\frac{1}{2}$ in. PARTITION WALLS.

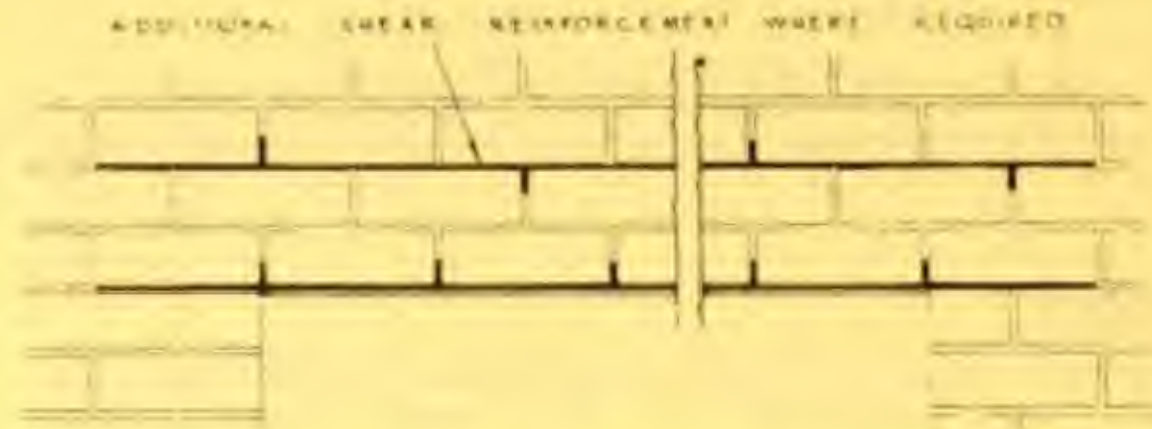
Span.	Courses to be Built in Cement Mortar.	Reinforcement.	
		Gauge.	Width.
6 feet	8	14	x 4 in.
8 feet	11	14	x 4 in.
10 feet	13	14	x $4\frac{1}{2}$ in.
12 feet	16	12	x 4 in.
14 feet	19	12	x 4 in.
16 feet	22	12	x $4\frac{1}{2}$ in.

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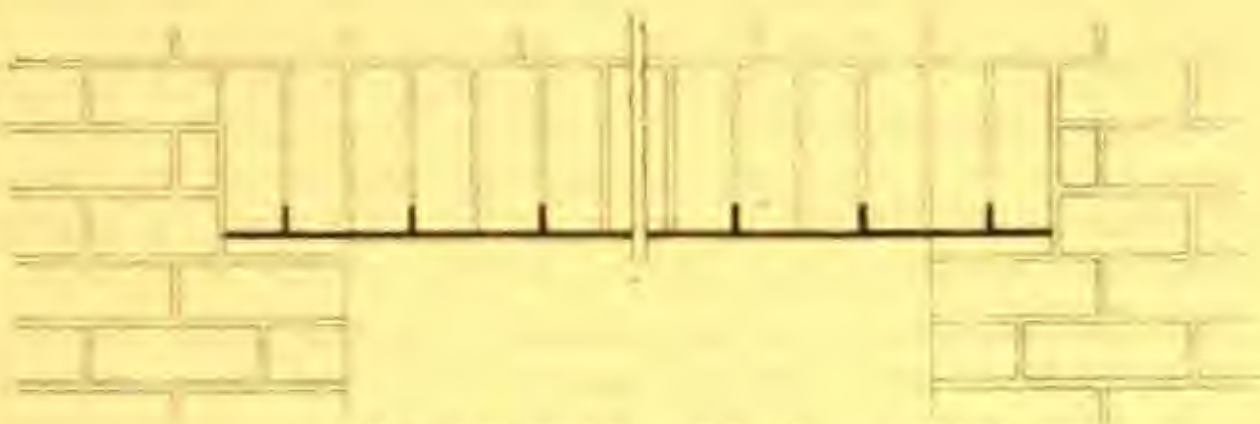




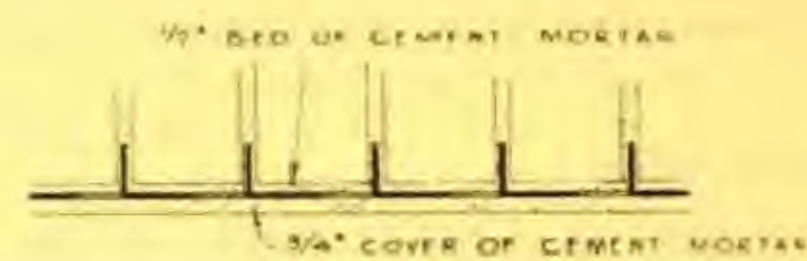
3" SOLDIER BRICK LINTEL  
FOR EXTERNAL OPENINGS  
LUGS EACH JOINT



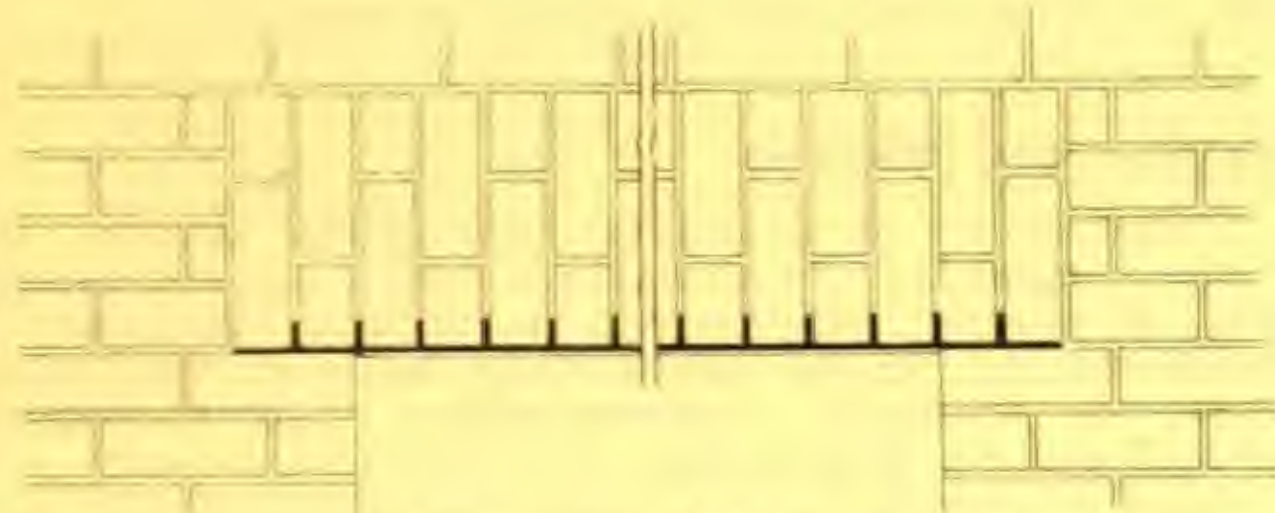
STRETCHER BOND LINTEL  
FOR INTERNAL OPENINGS  
LUGS EACH JOINT



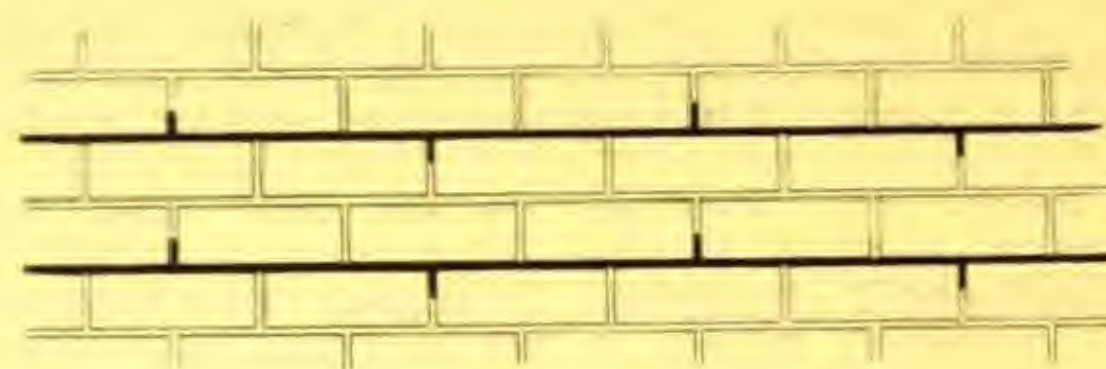
9" SOLDIER BRICK LINTEL  
FOR EXTERNAL OPENINGS  
LUGS EACH ALTERNATE JOINT



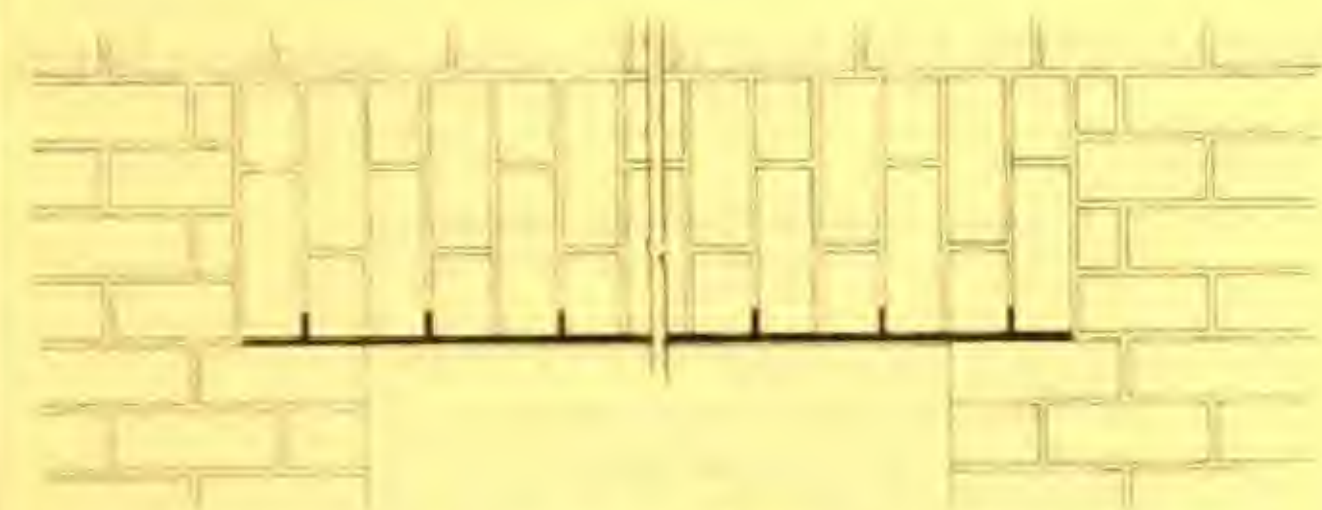
DETAIL OF STEEL PROTECTION  
FOR EXTERNAL OPENINGS



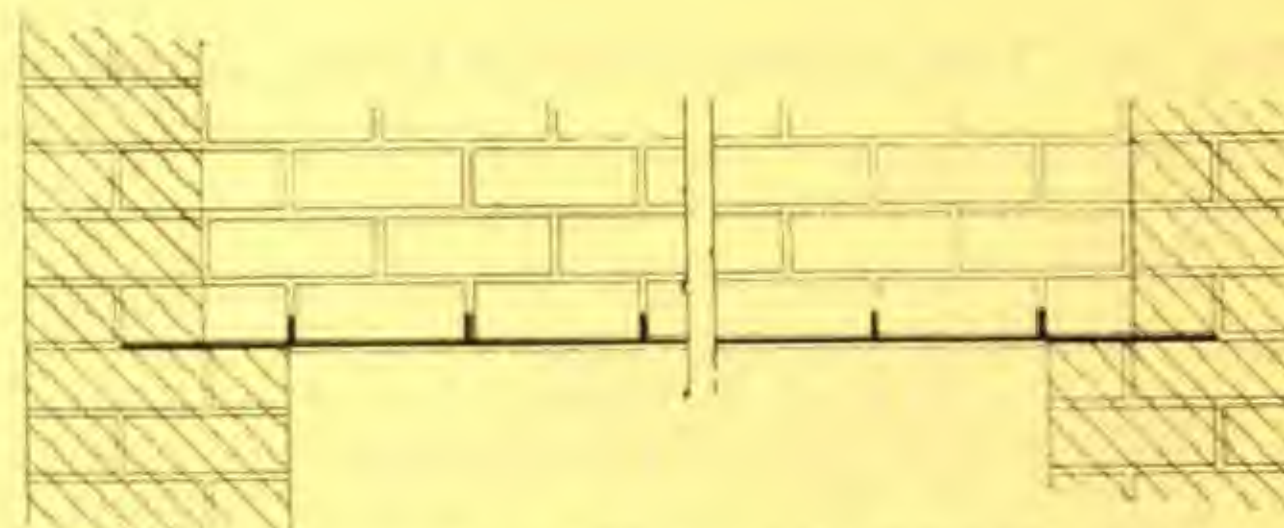
14" SOLDIER BRICK LINTEL  
FOR EXTERNAL OPENINGS  
LUGS EACH ALTERNATE JOINT



STRETCHER BOND WALL REINFORCEMENT



14" SOLDIER BRICK LINTEL  
FOR EXTERNAL OPENINGS  
LUGS EACH ALTERNATE JOINT



PARTITION WALL REINFORCEMENT  
PARTITION WALL TO BE BUILT IN CEMENT  
MORTAR FOR NUMBER OF COURSES AS SET  
OUT IN LOAD TABLE

LUGSTEEL

DETAILS OF BUILDING-IN LUGSTEEL  
BRICKWORK REINFORCEMENT

DRAWING  
NO. 1



<div style="text-align: center; font-size: 2em; font-weight: bold;">7</div> <div style="text-align: center; font-size: 0.8em;">S.A.A. File No.</div>	<h2 style="margin: 0;">COLEMANOID</h2> <p style="margin: 0;">A PRODUCT OF THE ADAMITE CO. LTD., LONDON</p> <p style="margin: 0;">COLEMANOID DISTRIBUTORS:</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p><b>NEW SOUTH WALES:</b>            Frank Hambridge,            22 Bridge Street, Sydney, N.S.W.            The Temple Roofing Co.,            14 Martin Place, Sydney, N.S.W.</p> <p><b>VICTORIA AND TASMANIA:</b>            H. Perks &amp; Co. Pty. Ltd.,            31 Queen Street, Melbourne, Vic.</p> </div> <div style="width: 45%;"> <p><b>QUEENSLAND:</b>            Underhill, Day &amp; Co. Ltd.,            Queen Street, Brisbane, Qld.</p> <p><b>STH. AUSTRALIA &amp; WEST AUSTRALIA:</b>            Francis H. Snow Pty. Ltd.,            King William Street, Adelaide, S.A.</p> <p><b>N.Z.:</b> G. L. Tacon &amp; Co., Panama Street,            Wellington.</p> </div> </div>	<b>CONCRETE WATER- PROOFER AND HARDENER</b>

### "Colemanoid"

"Colemanoid" is a liquid chemical compound—a waterproofer and hardener for Portland cement concrete. When added, in a certain percentage to the gauging water of Portland cement mixtures, it produces, without retarding setting, a dense and hard concrete not only impervious to moisture and water, but to the penetration of heavy oils, gas and acid solutions. Its use ensures the filling of voids and the formation of a hard and insoluble silicate of great tensile strength. Successful solutions of difficult and intricate concrete problems during the past 25 years demonstrate the waterproofing qualities of "Colemanoid."

### As a Water-Proofing

Waterproofing may be effected either in the concrete mass or by a cement rendering if "Colemanoid" is added to the gauging water in the proportions stated in the specifications. Either method will properly waterproof a concrete wall against a head of water. "Colemanoid" is ready for use and adds to the job no expense of mixing or stirring, and is of exceptional value where work is being carried out by unskilled labour. But once in the gauging water it must be in every part of properly mixed concrete. The use of "Colemanoid" in mass concrete retaining walls considerably speeds the work and saves the expense of the old-fashioned types of asphalt renderings.

When mixed with Portland cement and sand, and applied as a coating to the interior or exterior of walls, "Colemanoid" produces a complete waterproofing material. Similarly mixed, it provides excellent damp-proofing and waterproofing for brick mortar, as well as a preventative against efflorescence. Mixed with water and cement, it forms a damp-proof paint which can be used for grouting or application to inside masonry walls.

### As a Floor Hardener

"Colemanoid" mixed in the gauging water of concrete floor toppings, whether the toppings be of cement and crushed bluestone, or of coarse sand and cement, has no equal for producing a Portland cement concrete floor surface that is dustless and presents the maximum of resistance to wear and tear. It increases the hardness of the concrete of which it is an integral component. At the age of three days the hardness of a "Colemanoid" topping finish is equal to that normally attained in one month's time. "Colemanoid" increases both the tensile and compressive strength of concrete by 22 per cent. to 25 per cent. It does not affect the colour of the floor. Any desired colour for floors may be obtained by adding a small proportion of mineral oxide to the dry mix.

The application of "Colemanoid" to the floor topping is economical—one gallon being required for approximately 100 sq. ft. to 120 sq. ft. of 1 in. floor finish, which will withstand heavy traffic and be impervious to oils, greases and acids. "Colemanoid" is therefore recommended for use in sugar refineries, breweries, tanneries, dairies, paper mills, etc., and wherever unusual acid, oil or general service conditions prevail.

### Supplies and Service

"Colemanoid" is available in 4-gallon drums. No charge is made for the containers, which are not returnable. If desired, delivery can be made at exact cost of transportation. Large stocks are kept at the warehouses of interstate representatives, and immediate delivery can be guaranteed.

Detailed specifications or advice on any waterproofing subject are available, without cost, to the architect, engineer, and contractor.

## SOME OF THE MORE IMPORTANT JOBS IN WHICH "COLEMANOID" HAS BEEN USED:

### NEW SOUTH WALES—

- Peters American Delicacy Factory, Newcastle.  
 Architect:  
 Builders: MacConnell Building Co., and McLeod & Sons, Plasterers.
- Bondi Beautification Scheme, Bondi.  
 Architect: Robertson & Marks.  
 Builders: MacConnell Building Co.
- J. Kitchen & Sons, Soap Works, Alexandria.  
 Architect: Mr. Benn.  
 Builder: Mr. A. C. T. Turner.
- Sun Newspapers Ltd., Sydney.  
 Architect: Mr. J. Kethel.  
 Builders: Concrete Constructions Ltd.
- Brook House, Sydney.  
 Architects: Spencer & Spencer.  
 Builders: H. W. Thompson & Co.

### VICTORIA—

- Austin Hospital for Chronic Diseases, Heidelberg.  
 Architects: Stephenson & Meldrum.  
 Builders: T. R. & L. Cockram.
- Queen Victoria Hospital, Melbourne.  
 Architects: Stephenson & Meldrum.  
 Builders: W. C. Burne & Sons.
- Carba Dry Ice Factory, Abbotsford.  
 Architect:  
 Builders: Clements Langford Pty. Ltd.
- "Truth" Building, Melbourne.  
 Architects: Godfrey & Spowers.  
 Builders: Hansen & Yuncen.
- Carreras Tobacco Factory, Prahran.  
 Architect: J. Plottel.  
 Builders: Permasite Flooring & Partition Co.

### QUEENSLAND—

- Little Flower Church, Kedron, Brisbane.  
 Architects: Hennessey & Hennessey.  
 Builders: S. S. Carrick.
- Tramway Department, Brisbane.  
 Architect: Mr. Ogg.  
 Builders: Tramway Department.
- Dalgity's Hide Stores, Brisbane.  
 Architect: F. Hall.  
 Builder: A. Midson.
- Mount Isa Mines Ltd., Mount Isa.  
 Architect: M. J. Callow.  
 Builders: Mount Isa Construction Branch.

### WORK EXECUTED—

#### SOUTH AUSTRALIA—

- Waterproofing inside walls and fountain-pool of S.A. War Memorial.  
 Architects: Woods, Bagot, Jory & Laybourne-Smith.  
 Contractor: S.A. Monumental Works Limited.
- Waterproofing retaining wall and elevator pits, Elder, Smith & Co. Ltd., Wool Store, Port Adelaide.  
 Architects: Woods, Bagot, Jory & Laybourne-Smith.  
 Contractors: Fricker Bros.
- Waterproofing retaining wall "Advertiser" Building.  
 Architects: Woods, Bagot, Jory & Laybourne-Smith.  
 Contractors: Fricker Bros.
- Glenelg Corporation—Waterproofing basements of kiosks on sea wall level below high water level.  
 Architect: Glenelg Corporation Engineer.  
 Contractor: Glenelg Corporation.

(Continued on next page)



## ARCHITECT'S SPECIFICATION

## WATERPROOFING MASS CONCRETE

To the 4:2:1 mix, for gauging, add  $1\frac{1}{2}$  gallons of "Colemanoid" for every cubic yard of concrete. Proper consistency will be obtained if one gallon of "Colemanoid" is added to each 10 to 15 gallons of gauging water. Waterproofing shall be carried up to a point one foot above grade line. If forms are below water level, concrete shall be poured stiff.

Wherever possible, floor slabs, exterior walls and floorings shall be poured in the one operation. If construction joints are necessary, they shall be made as later specified.

Note.—To resist acid attacks, specify a proportion of one gallon of "Colemanoid" to six of water.

## WATERPROOFING IN COATINGS

Note.—First specify the interior or exterior surfaces of exterior walls and upper surfaces of concrete slabs below grade that are to be treated.

These surfaces shall be waterproofed by the application of a plaster coat of one part Portland cement, and two parts of clean sharp sand, gauged and tempered with a solution of one part of "Colemanoid" to each 10 parts of water.

Wall coatings shall be  $\frac{3}{4}$  in. thick, properly bonded and covered to floor, and carried up to one foot above the grade.

Floor work shall be one inch thick, and serve the double purpose of waterproofing and making a hard, dustless floor surface. (See Specification for "Floor Hardener.")

The Adamite Company's complete specification will be sent on application to the Distributor—see list top first page.

## BRICKWORK MORTAR

The mortar shall consist of one part Portland cement and two parts of well washed sharp sand, tempered with a liquid composed of one gallon of "Colemanoid" to each 10 gallons of water.

## FLOOR HARDENER

Lay upon concrete floor slabs a one inch topping course of one part Portland cement (a) two parts of clean, hard, sharp sand of coarse grain and silicate character, or (b) two parts of finely-graded bluestone screenings. The dry mix shall be gauged and tempered by adding "Colemanoid" to all water used, in the proportions of one gallon of "Colemanoid" to each 10 gallons of water.

Note.—Strike out (a) or (b) as desired. For resistance to grease and acid attacks, specify one gallon of "Colemanoid" to six of water.

## CONSTRUCTION JOINTS

To insure a bond to underlying masonry, all surfaces, before application of waterproofing on new concrete, shall be thoroughly roughened, cleaned, dampened, and a grout (composed of one part "Colemanoid," three parts water, and sufficient Portland cement to give the mixture the consistency of a heavy paint) brushed on the roughened surfaces. New work shall be applied within an hour after the base surfaces have been grouted.

## SPECIFICATION FOR BRICKLAYER

(Prepared by the Architectural Staff of Ramsay's Catalogue)

Note.—This specification has been prepared primarily for use in connection with average-size residential job.

## MATERIALS.

## BRICKS

Common Bricks—Shall be first quality, hard machine-made bricks, uniform in size, with good arrises.

Common bricks for facing shall be selected from those having uniform colour and undamaged arrises.

Pressed Facing Bricks—Shall be best quality red (or specify colour) and obtained from \*..... In all cases, the visible arrises shall be undamaged.

Moulded Facing Bricks—Shall be best quality red (or specify colour) and obtained from \*..... These bricks shall be of the manufacturer's type number as shown on drawings.

## SAND

Sand for mortar shall be clean, sharp, pit or freshwater sand, free from loam, clay, dust or vegetable matter.

## MORTAR

Lime Mortar—Shall consist of two parts of sand to one part of freshly-burnt lime from an approved kiln, thoroughly slaked in a mixing box, and sieved before being mixed with sand.

Cement Mortar—Shall consist of three parts of sand to one part of Portland cement. Portland cement shall in all respects comply with the tests and requirements of the Australian Standard specifications for Portland cement.

Waterproof Mortar—All mortar for all brick walls of the basement walls shall be waterproofed with \*..... added to the cement mortar according to manufacturer's specification.

## WORKMANSHIP.

## PRELIMINARY

All brickwork shall be set out and built according to the various dimensions, thicknesses and heights shown on the drawings.

All bricks shall be well wetted before use.

All walls shall be carried up in a uniform manner, with joints thoroughly flushed up as the work proceeds.

Perpends and quoins shall be carefully kept and the whole properly bonded together.

## BONDS

Cavity Work—Shall be 11 in. in thickness; the walls being bound together every 2 ft. 3 in. apart in every fourth course with approved galvanized wall ties.

Cavities shall be kept free from mortar droppings.

Solid Work—All solid brickwork shall be laid in English bond, consisting of alternate courses of headers and stretchers.

## JOINTS

The height of four courses of bricks laid in mortar shall equal  $13\frac{1}{2}$  in. (or.....).

Exposed brickwork shall be finished with neatly executed struck joints.

Internal walls of basement shall be finished with flush joints.

Brickwork joints of external walls that are to be finished in stucco, as well as all internal walls, excepting those otherwise described, shall be raked out.

Rake out joints for and point all flashings in cement, and also to all frames.

## FOUNDATIONS AND BASEMENT

All brick footings, foundation walls and basement walls up to the underside of ground floor plates shall be laid in cement mortar.

All basement walls shall be laid in the previously specified waterproof mortar.

Horizontal Damp Course.—Lay over the full thickness of all walls at the levels shown on the drawings, the \*..... horizontal damp course previously specified.

Vertical Damp Course.—The external walls of the basement shall have the previously specified vertical damp course laid in the walls, in the position shown on the drawing, from the level of the horizontal damp course to the underside of concrete floor slab. (See manufacturer's detailed specification.)

## FACINGS

Excepting where otherwise shown, the whole of the external walls shall be faced with the previously specified selected common bricks.

Special Brick Facings.—Where shown, the special brick facing shall consist of the previously specified facing and moulded bricks carefully executed with all arches, moulds, strings, angles, etc., built in accordance with the details of elevation.

## WALLS GENERALLY

Offsets.—Build all necessary brick offsets for floor plates—oversail where possible, for bearing to concrete floors.

Building In.—Build in all door and window frames, bedded solid in reveals.

Ends of first floor joists shall be embedded in external walls with a bearing on  $1\frac{1}{2}$  in. galv. hoop-iron strips solidly built into the courses.

Ventilators.—Leave openings under all internal doorways to provide ventilation under floor.

Terra Cotta Vents.—Provide and build in where directed No. .... 9 x 6 in. terra cotta air bricks.

Chases, Reveals and Cutting.—Form chases and reveals to receive frames, pipes, etc., as required or shown on drawings. Cut away as required for other trades, and make good after same.

## FIREPLACES AND CHIMNEYS

Fireplaces.—All fireplaces shall be constructed in accordance with the detailed drawings, and with the exception of the kitchen fireplace, shall have all jambs, returns and backings faced with the previously specified facing bricks.

All brickwork shall be struck jointed.

Allow for solidly fixing and setting a selected range in the kitchen fireplace, which shall be constructed with common bricks, as shown, with opening to lintel, ..... ft. .... in. high. All exposed portions of this range shall be tiled as specified in "Tiler."

Allow a P.C. sum of ..... for the above range. (See Index.)

Openings.—Unless otherwise specified, all fireplace openings shall have ..... in. camber bars (or steel angles).

Stacks and Flues.—Build all stacks and flues to the dimensions shown with graduated bends and smooth-rendered flues.

\*See Index for further information re description and manufacturers' specifications.



<div>7</div> <div>S.A.A. File No.</div>	<div> <p style="text-align: center;"><b>NONPORITE PTY. LTD.</b>  <i>Manufacturers &amp; Contractors</i>  <b>Masonry Waterproofings - - - Furnace Refractories</b></p> </div> <div> <p style="text-align: center;">294-296 BURWOOD ROAD, HAWTHORN, E.2.  VICTORIA.  Tel. Haw. 1060.</p> </div>	<div>NON-PORITE</div>
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### "Nonporite" Waterproofing Products

Nonporite Nos. 1, 1a, 2, 3.  
Masonry Stains.  
Bituminous Mastic Cement.  
Metalcote Floor Hardener.  
Metalcote Waterproofer.  
Sil-Col Stone Preservative.  
Nonporite Slip-proof Grains.  
Caulking Compound.  
Duraseal Cement Colorant.  
Durawax.

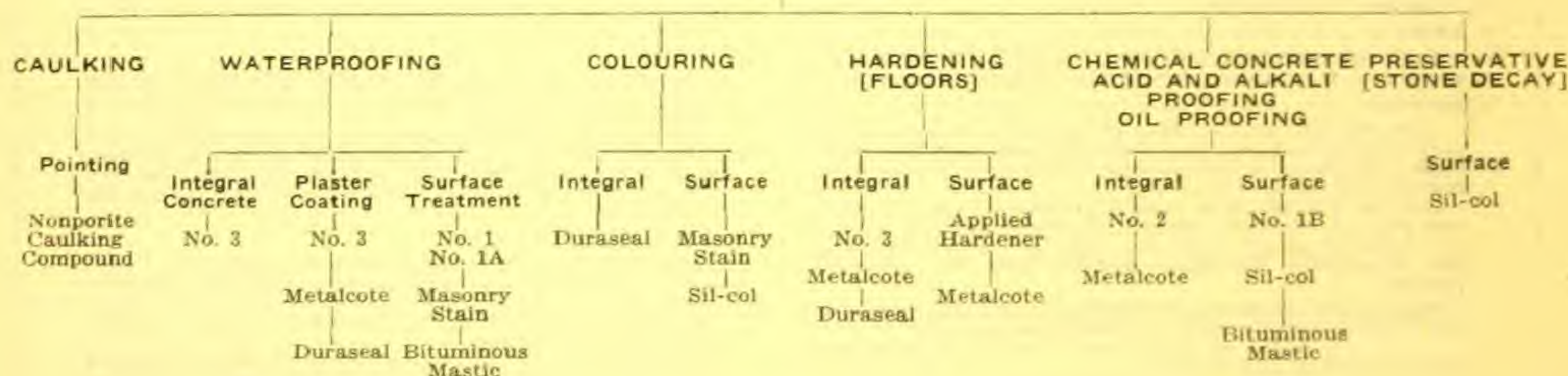
### Advisory and Estimating Services

The services of the Nonporite Chemists and Engineers are available on all problems of Masonry Waterproofing, Decoration and Preservation. Detailed recommendations and estimates are submitted by our Contract Department for carrying out the work under guarantee.

### Supervision

Where desired, the services of a Nonporite Working Supervisor are available, at cost, to ensure the correct application of the particular Nonporite Product.

### SELECTION CHART OF NONPORITE WATERPROOFING AND PRESERVATIVE PRODUCTS FOR BUILDING MATERIALS



#### NONPORITE No. 1 and 1A

**Uses.**—No. 1, a transparent, No. 1A, a colourless, waterproofing liquids for application to the exterior of brick, stone, stucco or concrete walls, above grade. The waterproofing is absorbed into all the pores, filling them with inert water-repellant compounds.

**Method of Application.**—To the clean, dry surface, apply not less than two coats of Nonporite No. 1 or 1A.

**Covering Capacity.**—Varies inversely as the porosity of the surface. Average covering one gallon to 100 sq. ft., two-coat work.

#### NONPORITE No. 2

**Uses.**—A fine white, highly water-repellant integral cement water-proofing powder for mixing with cement in concrete or mortar, to make it permanently dampproof and waterproof.

Specially recommended for electrolysis conditions.

**Method of Application.**—Mix the dry powder with the cement and sand, prior to the addition of the mixing water.

**Covering Capacity.**—For average work, use 2-4 lbs. per cubic foot (94 lbs.) bag of cement.

#### NONPORITE No. 3

**Uses.**—An integral cement waterproofer in liquid form for damp-proofing, waterproofing, accelerating and hardening the cement work. Used for reservoirs, tanks, basements, damp-courses, leaky walls, etc.

**Method of Application.**—Use as a rule one quart of Nonporite No. 3 to each cubic foot (94 lbs.) bag of cement. See detailed specifications.

**Covering Capacity.**—For concrete, 1½ gallons of Nonporite No. 3 per cubic yard, 1:2:4 mix.

For plaster work, one gallon per 11 square yards, ½-in. thick.

#### BITUMINOUS MASTIC CEMENT

**Uses.**—A black waterproofing and caulking compound for repairing the roofs, damp-proofing walls, stopping leaks, coating roofs, sealing cracks, etc. It consists of selected water-proofing bases and fibrous asbestos and is ready for immediate use. Applied cold.

**Method of Application.**—Apply with brush or trowel, according to the nature of the work. Use "AA" brand for acid and alkali work.

**Covering Capacity.**—33-100 sq. ft. per gallon, according to the nature of the work.



**METALCOTE FLOOR HARDENER**

**Uses.**—Consists essentially of specially treated and graded metallic aggregate free from slag and inert fillers, to be used with sand and cement for the production of integrally hardened cement floors.

**Method of Application.**—Metalcote is used in both topping and monolithic floors for railroad platforms, factories, garages, piers, and for all floors subjected to rough use and heavy duty.

**Covering Capacity.**—Use 20-40 lbs. of Metalcote per 100 sq. ft. of surface, according to nature of traffic.

**METALCOTE WATERPROOFER**

**Uses.**—A metallic surface waterproofing for walls, tanks, vats, basements, etc. It consists essentially of a chemically combined fine metallic base which, in contact with air and moisture, rapidly oxidises. The oxidation causes the metallic base to expand fourfold.

**Method of Application.**—Applied by means of a brush, in successive coatings, to the thoroughly clean, damp wall.

**Covering Capacity.**—Use 30-40 lbs. of Metalcote Waterproofer per 100 sq. ft. of surface.

**MASONRY STAIN—ALL COLOURS**

**Uses.**—A waterproofing and decorating coating for exposed masonry surfaces such as concrete, brick, stucco, etc. Nonporite Masonry Stain penetrates into the pores, becoming an integral part of the surface and gives a clean, flat, uniform appearance, with but slight change of the surface texture.

**Method of Application.**  
—To the clean, dry surface, apply at least two coats of the Masonry Stain, by means of a brush or spray.

**Covering Capacity.**—Varies inversely as the porosity of the surface. Average, 100 sq. ft. per gallon, two coats.

**SIL-COL STONE PRESERVATIVE**

**Uses.**—Sil-Col is an organic Silicon compound consisting essentially of Silicon Ester. It is used as a preservative for decaying stone, brick and masonry by surface applications.

**Method of Application.**  
—Apply Sil-Col by brush or spray to the clean, dry surface. Allow at least twenty-four hours between successive coats.

**Covering Capacity.**—For average work, 100 sq. ft. per gallon, two-coat work.

**SLIP-PROOF GRAINS**

**Uses.**—Nonporite Slip-proof Grains are used in cement floors for the production of a hard-wearing, non-slipping, and at the same time, smooth surface. They consist essentially of pure crystalline Silicon Carbide.

**Method of Application.**—Sprinkle the grains evenly over the freshly prepared work. Tamp, float and trowel in the usual manner.

**Covering Capacity.**—Use  $\frac{1}{4}$  lb. per square foot of surface.

**CAULKING COMPOUND—ALL COLOURS**

**Uses.**—A permanently elastic, durable, coloured, waterproof cement for caulking, jointing, pointing window frames, cracks and joints in brick, stone, terra-cotta, etc., doors and skylights.

**Method of Application.**—Rake out joints clean and dry and apply the Caulking Compound with a caulking tool or trowel.

**Covering Capacity.**—Where joints are wide, first ram with oakum, finally caulking up with Caulking Compound.

**DURASEAL CEMENT COLOURANT—STANDARD COLOURS**

**Uses.**—Duraseal is a cement colour in paste form, with which it readily works up. Use for colouring, hardening, dust-proofing, and waterproofing concrete and cement surfaces, especially floors.

**Method of Application.**  
—Dissolve the paste in water and then mix thoroughly with the cement and sand.

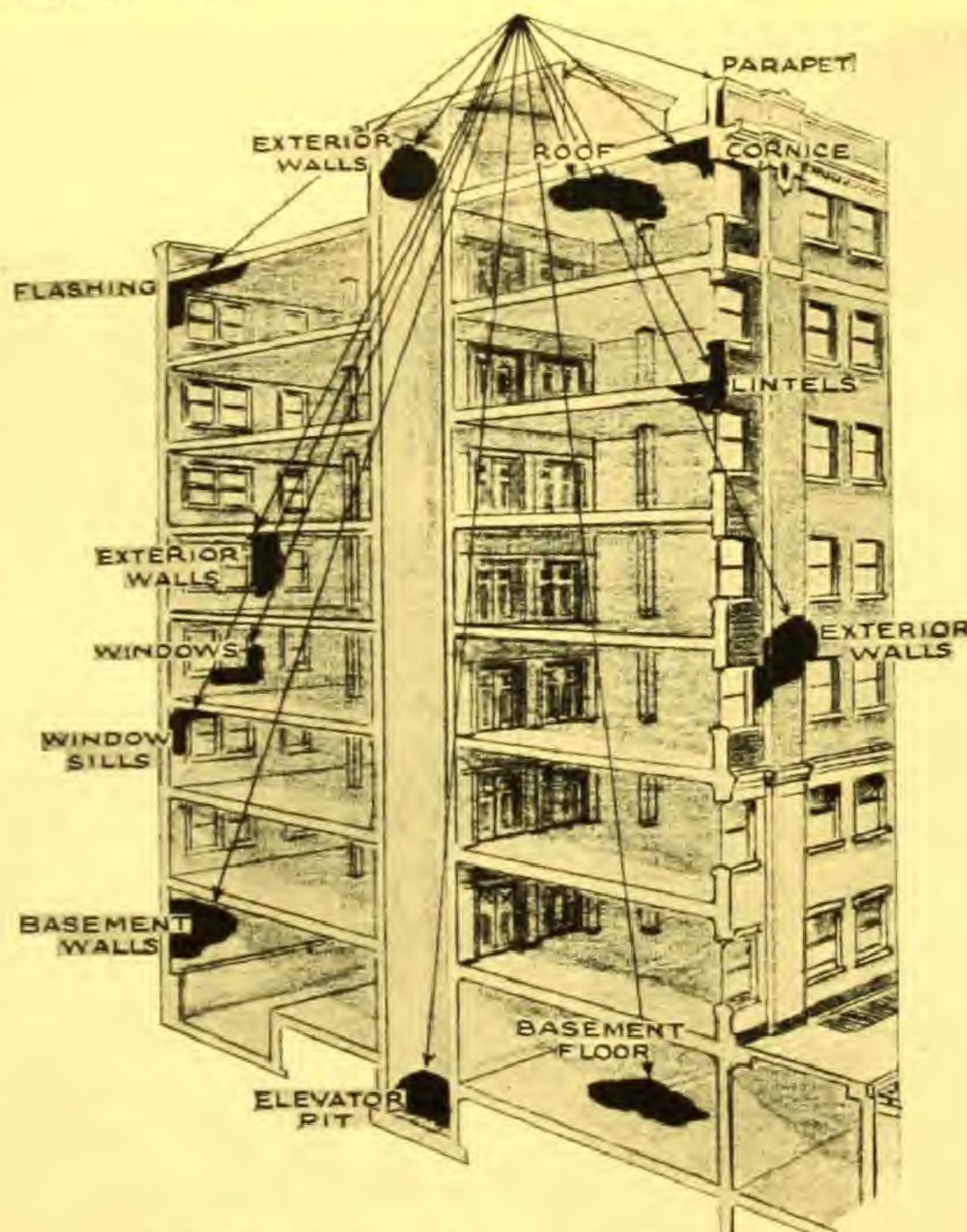
**Covering Capacity.**—Use  $\frac{1}{2}$  gallon to each cubic foot (94 lbs.) bag of cement.

**DURAWAX—STANDARD COLOURS**

**Uses.**—Durawax is a paste wax-polishing compound for application to plain and coloured cement surfaces, especially floors. It is made coloured and transparent.

**Method of Application.**  
—To the thoroughly dry floor, rub Durawax well into it with a cloth.

**Covering Capacity.**—Approximately 300 sq. ft. per lb.

**COMPLETE SPECIFICATION SHEETS AND DIRECTIONS ON APPLICATION.**

NONPORITE PRODUCTS APPLIED TO BUILDINGS

**REFRACTORY DIVISION.**

Refractory Bricks, Shapes and Cements; Plastic Refractories; Heat Insulation for Furnace Construction and Maintenance. Specifications, Index Guide, Price List on request.

**NONPORITE REFRACTORY PRODUCTS:—**

Refractite No. 1.—Fire Cement.  
Chromefractite.—Chrome Fire Cement.

Silfractite.—Silica Fire Cement.  
Carbolox (Silicon Carbide) Cements.  
Insulox.—Heat-Insulating Cement.  
Insulox.—Heat-Insulating Bricks and Shapes.  
Carbolox (Silicon Carbide) Bricks, Shapes, Muffles, etc. Any size or shape made to order.  
Plastofrax.—Plastic Refractory.

**AGENTS IN ALL STATES**



	<h1 style="text-align: center;">STANDARD QUARRIES PTY. LTD.</h1> <p style="text-align: center;">WEARING STREET, FOOTSCRAY VICTORIA</p> <p style="text-align: center;">Phone: Footscray 73</p>	
8		BLUESTONE — LIMESTONE — GRANITE — FREESTONE
S.A.A. File No.		

MASONRY CONTRACTORS

QUARRY MASTERS

### Products and Quarries

The Standard Quarries Pty. Ltd. was founded some 40 years ago at Footscray, Victoria, and since that time has, under capable management, steadily grown until to-day the company owns and operates quarries as well as a modern masonry dressing plant located at Footscray, which is capable of efficiently handling and working all types of stone.

Our products range from crushed road metal and screenings to carefully executed statuary, in the manufacture of which bluestone, limestone, freestone and granite all from our own quarries, is employed.

### Estimates—Samples—Service

Preliminary estimates will be gladly furnished on request of Architect or Contractor.

Samples of any of our building stones will be furnished on request and advice as to grade or style of finish desired. We shall be pleased at any time to confer with architects and place before them our knowledge on modern masonry. This service is freely offered wherever it may assist in the logical and proper use of building stone, whether quarried by us or others, or help to solve the economic and aesthetic problems which may arise when the use of building stone is under consideration.

Source  
of the  
Famous  
Stawell  
Stone.

An  
Exceptionally  
Fine-grained  
Freestone.



Gramplians  
Quarry,  
Stawell.

A Holding  
of the  
Standard  
Quarries  
Pty. Ltd.

Our quarry holdings are as follows:—Bluestone—Footscray, Victoria; Stawell Freestone—Gramplians, Victoria; Benara Limestone—Port MacDonell, S.A.; Red Granite—Dergholm, near Casterton, Victoria; Pink and Buff Granite—Warby Ranges, near Wangaratta, Victoria; Barrabool Hills Freestone—Geelong, Victoria.

### Stocks—Economies

Large stock of freestone blocks, also sawed slabs from 3 in. thickness up, are maintained at all times, assuring prompt delivery of finished work.

The modern method of quarrying employed in reducing waste and producing quarry stock of approximately true rectangularity, together with the modern cutting and finishing processes, most of which are accomplished by machine, reduces the hitherto high cost of the old hand methods.

(Continued on next page)



## DESCRIPTION OF STONES

## STAWELL — BARRABOOL HILLS — BENARA — CASTERTON

## Stawell Stone

(Ivory coloured and exceptionally fine grained)

"Stawell stone has excellent weathering properties, as shown by its low absorption, great resistance to corrosion by carbon-dioxide and to the action of mineral acids. It has very high crushing strength and chemically the stone is very stable and microscopically appears almost the ideal weathering standstone."—Henry C. Richards, M.Sc.

## Barrabool Hills Stone

(Light green in colour and fine grained)

"This has a very high absorption, and, while resistant to carbon-dioxide, is readily affected by mineral acids. It is light, has a low crushing strength and is easily dressed. Examination and tests indicate that the stone is only a fair one, and that when used in rough dressed blocks gives the best results."—Henry C. Richards, M.Sc.

## Benara Limestone

(Cream coloured and open grained)

"The limestone is an open textured stone which permits of ready drying by air. Though relatively soft when just quarried, the stone has the property of hardening very appreciably on prolonged exposure. Although relatively porous, it is found to be very satisfactory in its own district, which is wet and cold. The weathering properties of the stone when properly selected and cut by skilled masons are good, as shown by the stone in old buildings, where the moulds, carvings and projections, when carried out in bold type, are in excellent condition."—H. B. Hauser, M.Sc., Lecturer on Building Stone, Melbourne University.

## Comparative Cost of Stone Facings

In order to clear up a misconception which has been prevalent in Melbourne for many years, we have set out below a table of the comparative costs of the various stone facings, together with other facing materials.

Material.	Cost per sq. ft. unfixed. (Dec., 1930)	Typical Example.
Cement face, 2-coat work	6d.	A.P.A. Building, Melbourne
Snail Rubble (mixture of freestone granite and bluestone)	1/9	Villa faces, walls and fences, such as Stonehaven Court, Toorak
Bluestone Rubble	2/-	St. John's Church, Toorak, Vic.
Benara Limestone, sawn face	3/-	Old Colonists' Home, Melbourne
Tapestry Brick	3/1	Comedy Theatre, Melbourne
Benara Limestone, rock face	3/3	Old Colonists' Home, Melbourne
Barrabool Hills Freestone, rock face	4/6	Ormond College, Melbourne
Barrabool Hills Freestone, rubbed face	4/9	Footscray P.O.
Bluestone, axed or shotted face	4/9	Unity Hall, Bourke St., Melb.
Synthetic Cast Stone (pressed cement)	5/-	Comedy Theatre, Melbourne
Stawell Freestone, rock faced	6/6	Essendon War Memorial, Vic.
Sydney Freestone, sawn face	7/6	New A.M.P. Building, Melb.
Sydney Freestone, rock faced	7/6	Q'nsland Insurance Bldg., Melb.
Sydney Freestone, rubbed face	8/-	New A.M.P. Building, Melb.
Sydney Freestone, claw tool faced	8/6	New A.M.P. Building, Melb.
Harcourt Granite, rock faced	8/6	Savings Bank, Spencer St., Melb.
Stawell Freestone, rubbed face	9/-	Parliament House, Melbourne
Red Casterton Granite, rock faced	10/-	
Grey Harcourt Granite, exfoliated	10/-	
Grey Harcourt Granite, axed faced	11/6	Equitable Building, Melbourne
Red Casterton Granite, exfoliated	12/-	New A.M.P. Bldg., base, Melb.
Architectural Terra Cotta	12/-	Nicholas Building, Melbourne
Grey Harcourt Granite, polished	18/-	State Savings Bank, Elizabeth Street, Melbourne.
Red Casterton Granite, polished	20/-	Base of Bank of N.S.W., 190 Bourke St., Melbourne

Masonry in Relation to Modern Building  
Construction

In the design of the modern steel frame or reinforced concrete building, where the dead and live loads of the

## Granite and Bluestone

Granite has exceptional strength and durability, is practically non-absorbent, and indefinitely withstands exposure to climate and weather. It is available in a wide range of colours and texture and has infinite beauty and character, to be found in few other materials. It may be cut into any form desired, and dressed in a great variety of finishes. It takes a high and durable polish which will withstand long exposure to the weather.

Bluestone is a hard, dense basalt (dark grey in colour, with an open-textured face) and may be used for dimension stone. It is extensively quarried at Footscray, and in a crushed form is used for road metal, aggregate for concrete, etc.

## PHYSICAL PROPERTIES OF STANDARD QUARRIES' BUILDING STONES.

(For the sake of comparison, this list includes Harcourt Granite and Sydney Freestone.)

Stone.	Crushing load in lbs. per cu. in.	Weight per cu. ft.	Absorption by bulk, per cent.	Loss by Resistance to Acids, per cent.	Tests Given by
Stawell Freestone	17,550	148	5.64	0.108	Hy. C. Richards, M.Sc.
Barrabool Hills Freestone	3,297	134	16.46	1.417	Hy. C. Richards, M.Sc.
Benara Limestone	3,490	124	25.902	.74	B. H. Hauser, M.Sc.
Casterton Red Granite	14,900	168	0.39	—	
Wangaratta Pink and Buff Granite	9,670	152.5	4.08	—	K. McInerney, M.Sc.
Bluestone, Footscray	8,620	162	2.16	—	K. McInerney, M.Sc.
Sydney Freestone	7,366	144	8.40	1.031	Hy. C. Richards, M.Sc.
Harcourt Grey Granite	11,444	167.5	0.11	—	K. McInerney, M.Sc.

structure are carried independent of the facing materials, and where many simple devices are available for anchoring and carrying such facing materials, a new era in stone masonry is entered upon.

The day of solid stone buildings is past and stone becomes an embellishment rather than a feature of strength, though its beauty and texture can now be obtained at far less expense than previously; but, as in the past, good craftsmanship and careful selection of stone and wise setting out of constructional details are still very necessary.

As stone does not in the modern building carry the weight and can be built as a facing long after the frame and concrete wall are in position, it alters many of the age-long customs and requirements of stone cutting and setting. It is not longer necessary that alternative course should bond in the wall; usually two bonding courses to each floor is all that is required (see plate, page 51, illustrating the construction of the A.M.P. Building).

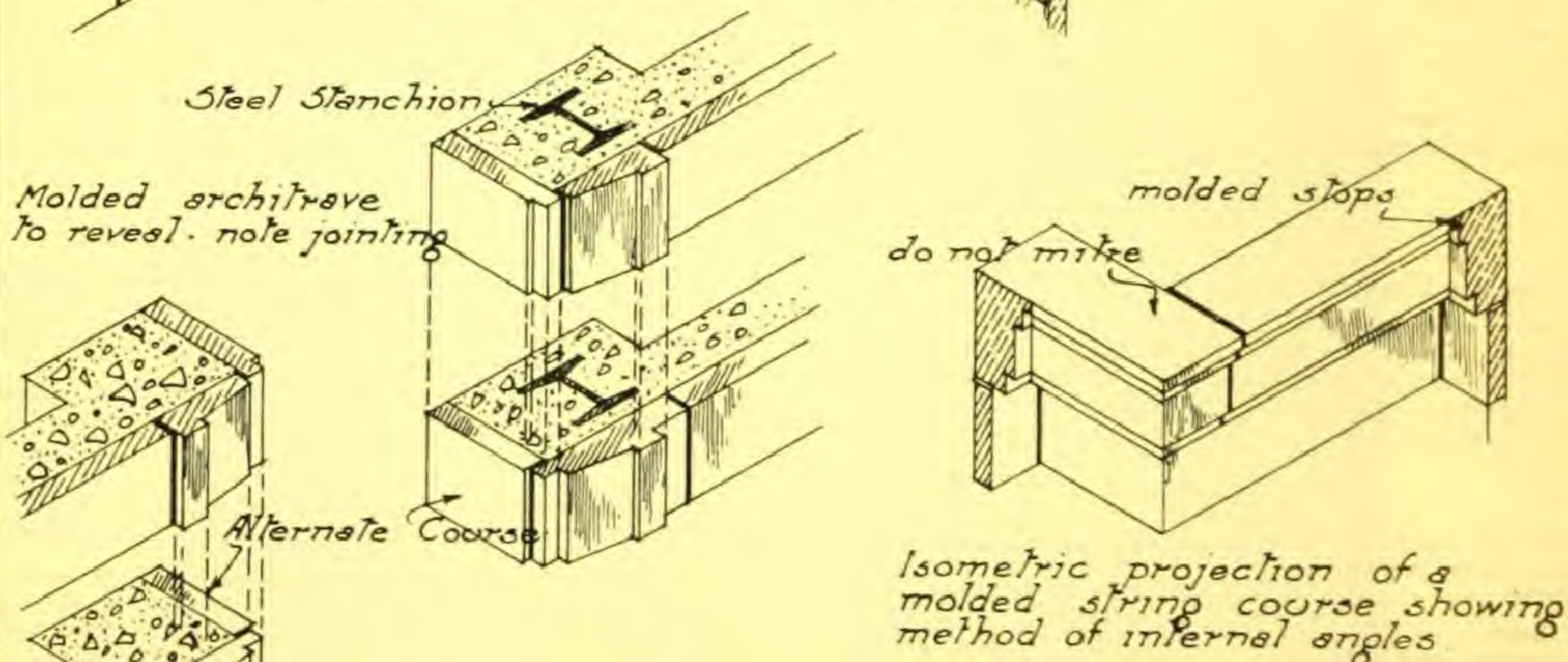
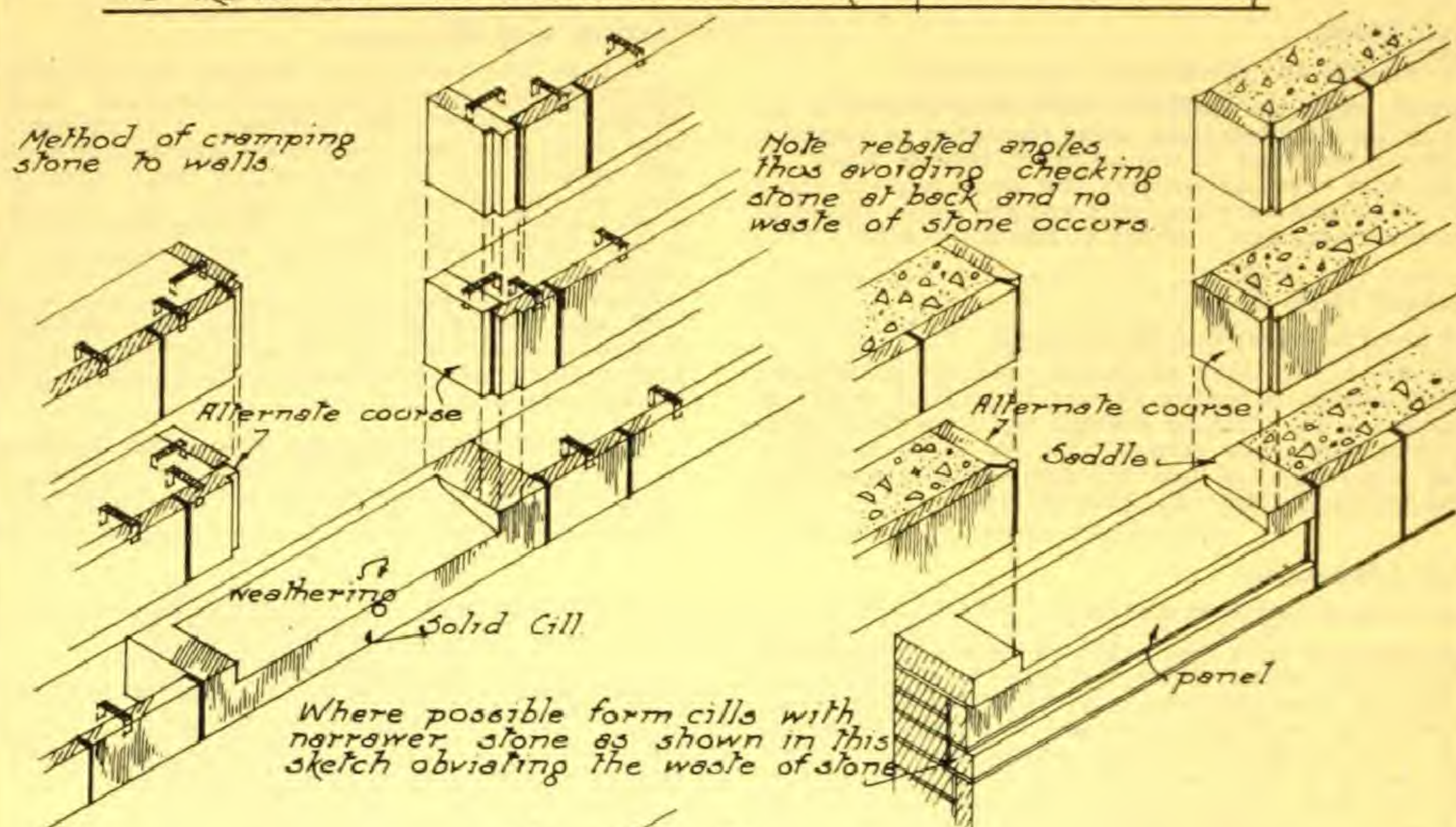
It is still necessary that the face bondings should be strictly adhered to, and the greatest difficulty lies at reveals and quoins in not showing the joint line of the thin facing stone. This is usually hidden by a member or feature and gives scope for the draughtsmanship of the architect. General typical examples of hiding this joint line are shown on the plate. One of the most costly operations in masonry is sunk and checked faces and backs, but by a little care the whole of these features can be obtained with straight slabs of stones and alternating joint and bed lines.

When making additions to existing buildings where it is necessary to match the stonework, this principle still holds good, as projecting reinforced concrete floors can carry the weight of such features as cornices (see State Savings Bank plate opposite), and steel joists can support lintels in slabs of box construction.

(Continued on next page)

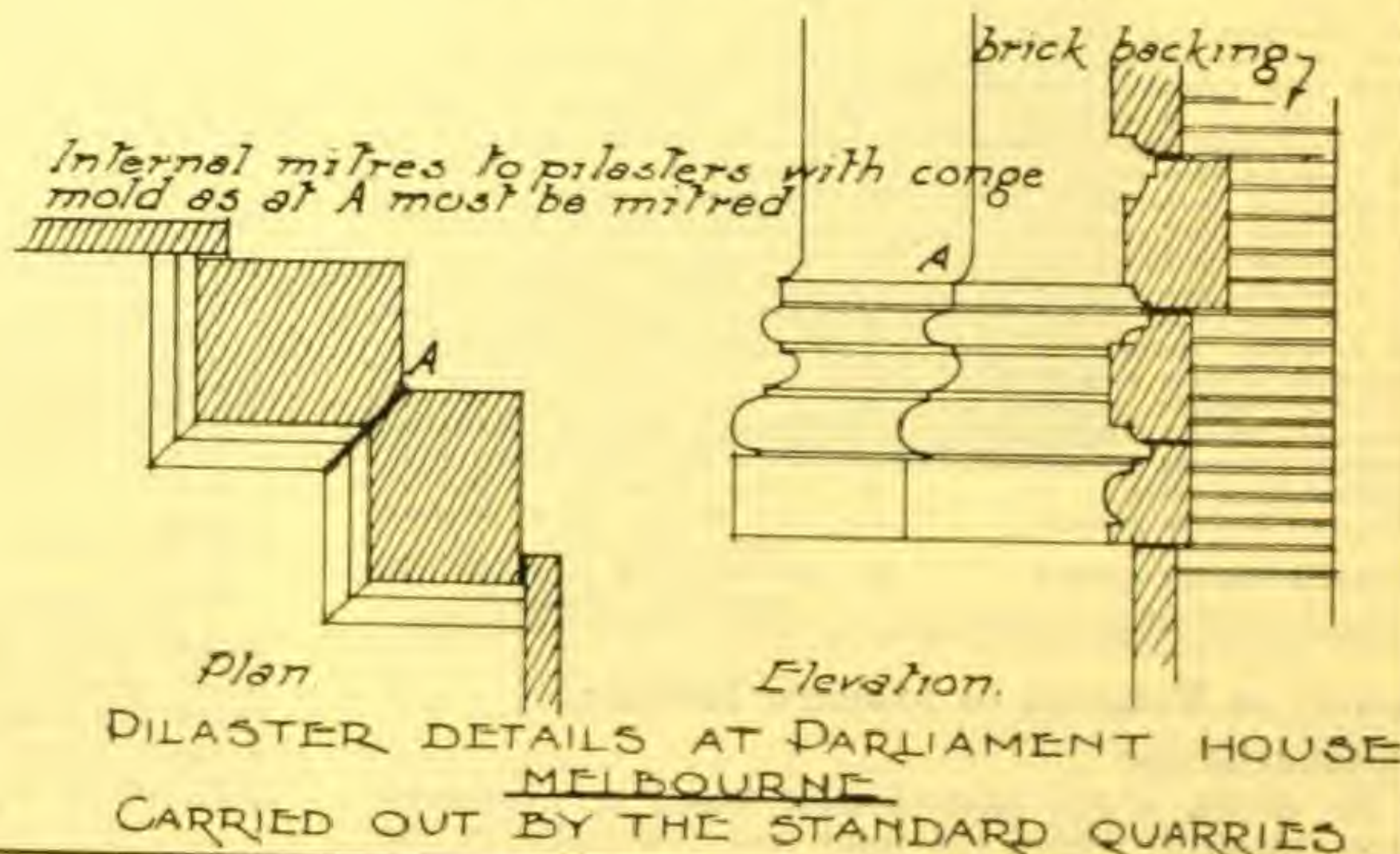


# VARIOUS METHODS OF JOINTING STONE FACINGS TO REVEALS TO OBVIATE CHECKING AND CUTTING



Stone facings need not be bonded to walls as the courses are held by metal cramps as shown above. If bonding is required an excellent method employed at the new A.M.P. Building Melbourne shown in sketch could be employed.

This work was carried out by THE STANDARD QUARRIES PTY. LTD.





## RECOMMENDED THICKNESS OF STONE FACINGS

NOTE.—The building regulations of Melbourne prescribing 4 inch thick as the minimum thickness of ashlar does not operate when outer walls are of the prescribed thickness.

The least thickness of facing stones recommended by us varies with the dressings on the face and the material used, thus:—

Casterton or Harcourt Granite—	
Polished faces .....	1½ in. thick
Shotted faces .....	1½ in. thick
Exfoliated faces .....	1½ in. thick
Rock face .....	6 in. thick
Stawell Freestone—	
Rubbed face .....	1½ in. thick
Sawn face .....	1½ in. thick
Rock face .....	6 in. thick

Sydney Freestone—	
Rubbed face .....	3½ in. thick
Sawn face .....	3½ in. thick
Rock face .....	7 in. thick
Barrabool Freestone—	
Rubbed face .....	4½ in. thick
Sawn face .....	4½ in. thick
Rock face .....	7 in. thick
Benara Limestone—	
Sawn face .....	2 in. thick
Rock face .....	4½ in. thick
Bluestone—	
Rubbed face .....	3 in. thick
Sawn face .....	3 in. thick
Rock face .....	6 in. thick

## TERMS USED IN THE DESCRIPTION OF MASONRY

Arris—The exterior angle of two surfaces meeting each other.  
 Ashlar—Stone of uniform height or courses.  
 Architrave—The mould surrounding door or window opening.  
 The lower section of an entablature.  
 Balustrade—Consists of a base, die, balusters, coping.  
 Balusters—Profiled columns between the base and coping.  
 Baluster Die-stone—Terminates a row of balusters, and consists of a half-baluster worked on the die.  
 Base—The bottom portion of any feature.  
 Batter—Face leaning inwards.  
 Break—A recess or projection of the wall.  
 Bond—Setting of stones so that joints of stone in one course are broken with those in courses above or below.  
 Boss—Usually a carved projection at the termination of hood mould.  
 Bracket—A projection from a wall or pier supporting some upper feature or structure.  
 Blocking Course—The crowning feature on top of a cornice.  
 Bullnose—A rounded projection, often on a step.  
 Boasting for Carving—Roughly worked projection.  
 Closer—The last stone to fill a gap in a course.  
 Corbel—Similar to bracket.  
 Coping—The top course of a wall or a feature.  
 Curtail Step—Has a circular quoin end.  
 Course—Layer of stones laid horizontally.  
 Crocket—Moulded projection on pinnacles or spires.  
 Coffin—A panel sunk in a soffit or projection.  
 Dado—A dwarfed wall facing, usually to stairs and corridors.  
 Dentils—Toothing in cornice.  
 Die—The portion between the base and the capping.  
 Entasis—The swelling of a pilaster or column.  
 Fascia—Band or plain course over an opening.  
 Fillets—Steps of similar widths.  
 Fillet—A narrow band supporting members of a mould.  
 Finial—The finishing part of a spire or pinnacle.  
 Frieze—The section of an entablature between the architrave and cornice.

Fluting—Vertical grooves, usually in columns.  
 Grout—Liquid cement or mortar for filling joints when setting.  
 Impost—The course upon which an arch rests.  
 Jambs—Stones, one above the other at the reveals of openings.  
 Joggle—A vee-shaped cut in joints to receive the grout.  
 Label—The mould over an opening.  
 Mullion—A vertical pier dividing a window.  
 Panel—A space either raised or sunk from surrounding work.  
 Pilaster—A square pillar projecting from face of wall.  
 Plinth—Base of a building, bottom member of a column base.  
 Quoin—Corner stone.  
 Quirk—A narrow sinking to a mould.  
 Reveal—The inside face of an opening.  
 Ramp and Twist—Face which rises and curves simultaneously.  
 Rough Back—The portion of stone opposite to the face, which is not seen.  
 Setting, Fixing, Walling, are similar terms, meaning to place stones in the wall of a building.  
 Soffit—The under face of a lintel or arch.  
 Springer or Skew Back—A sloping joint for arches, etc.  
 Stilted Arch—The curve of the arch raised above the impost course.  
 Stools—Horizontal beds at weatherings or splays.  
 Stringers—The slabs at the end of steps in a stairway.  
 String Course—Projecting band or mould course continued round the building.  
 Splay or Chamfer—Small face cut at an angle to surrounding faces.  
 Throat or Drip—A groove under a projecting stone.  
 Tympanum—That portion of a pediment between the raking and horizontal mould.  
 Transom—A horizontal stone dividing an opening.  
 Template—A stone under a R.S.J. to take the weight.  
 Volute—A spiral curve, as in an Ionic cap.  
 Voussoir or Arch Stone—Wedge-shaped stone of an arch.  
 Weathering—The splay on stops of sills and projecting stones to allow free fall of weather.

Benara  
Limestone  
can be used  
with full  
confidence—  
it is of a  
most pleasing  
texture and  
is of a light  
biscuit colour.



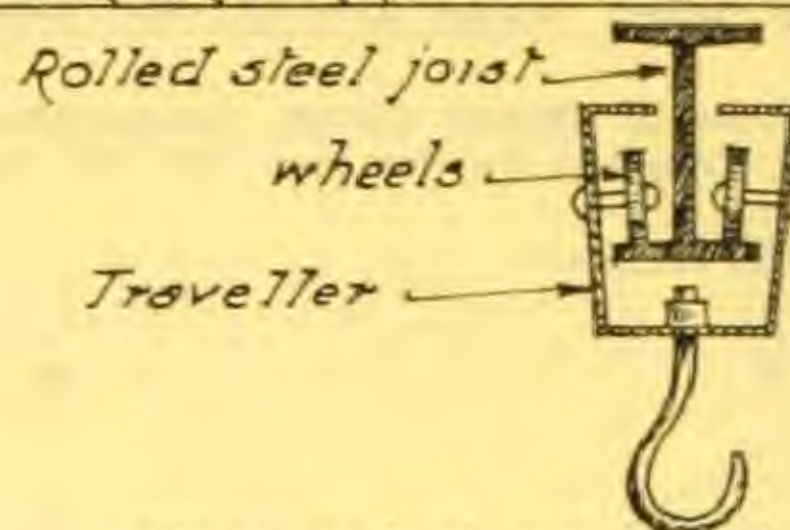
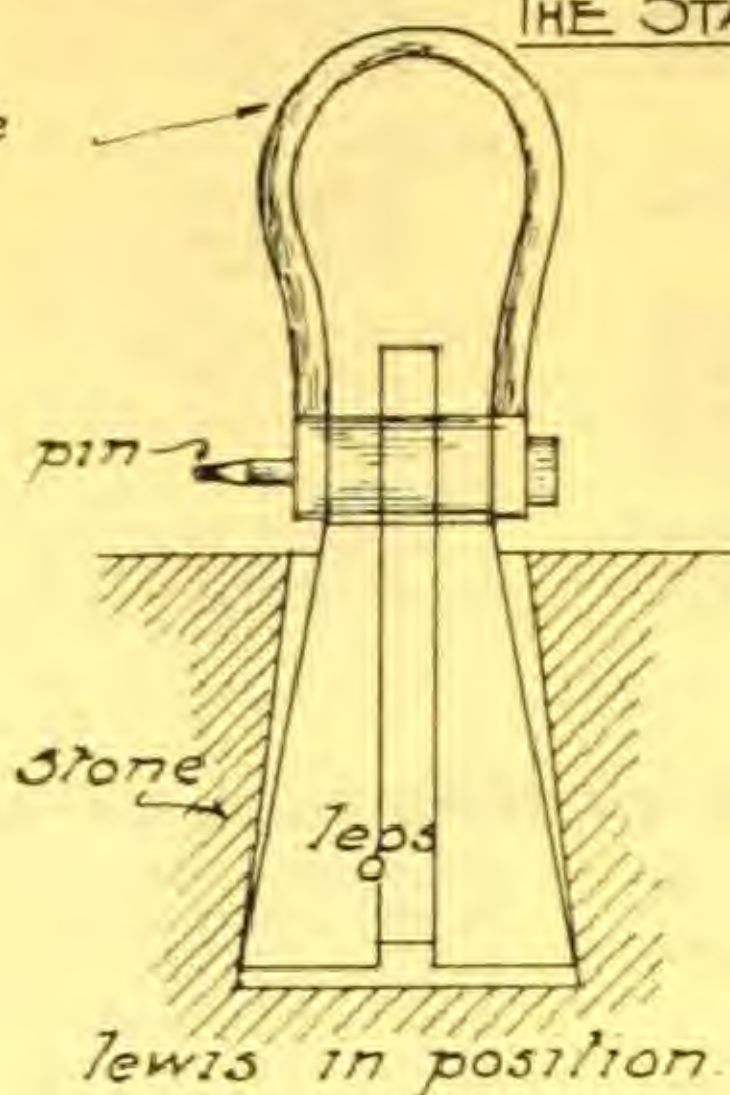
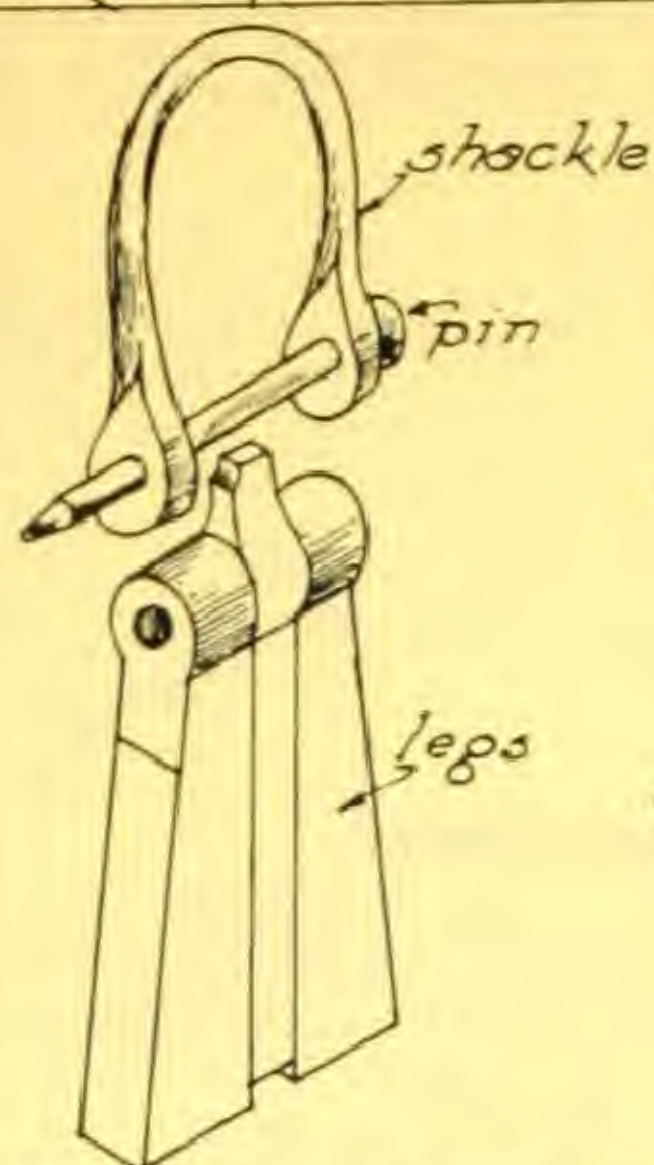
Methodist  
Church in  
South  
Australia,  
built 65 years  
ago.  
Limestone in  
good state of  
preservation.

(Continued on next page)



## VARIOUS APPLIANCES FOR LIFTING STONE USED BY

THE STANDARD QUARRIES PTY LTD TOOTSCRAY



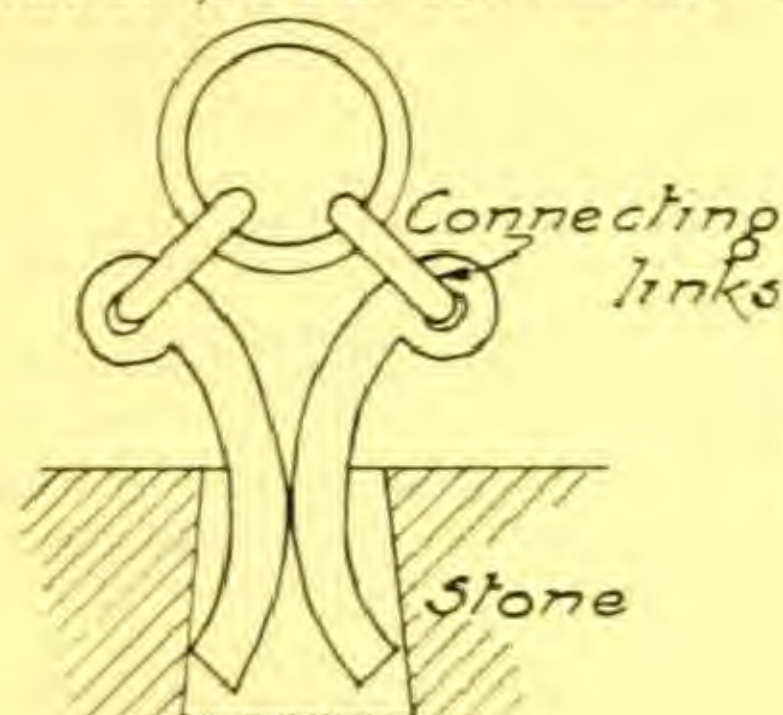
Connected on to this hook is an endless chain steel pulley block for lifting and setting stone

## A TRAVELLER FOR SETTING STONEWORK

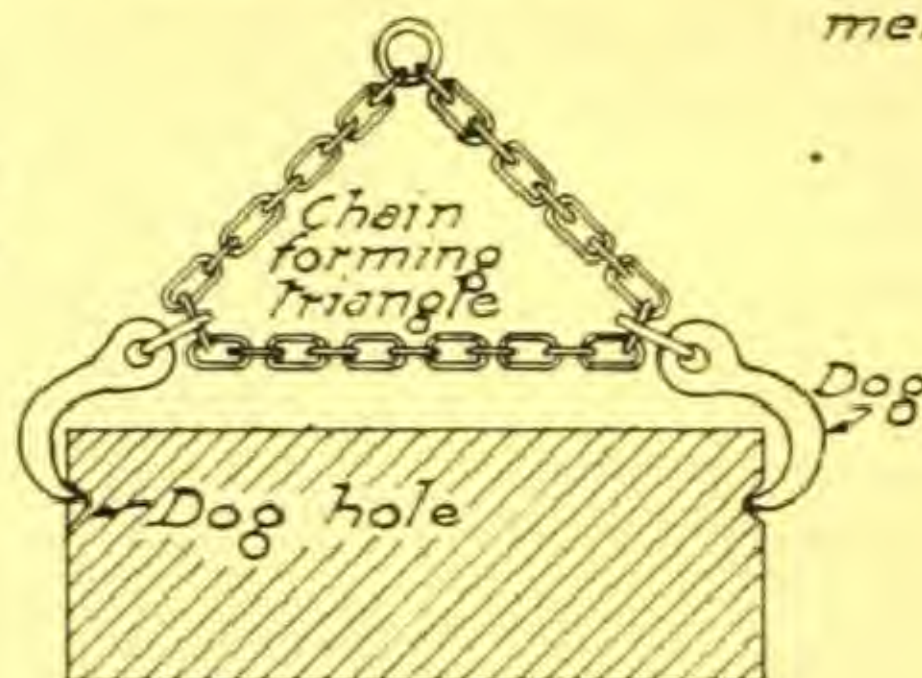
Rolled steel joist is usually supported on steel or wood cantilevers.

This is a convenient method of setting stone.

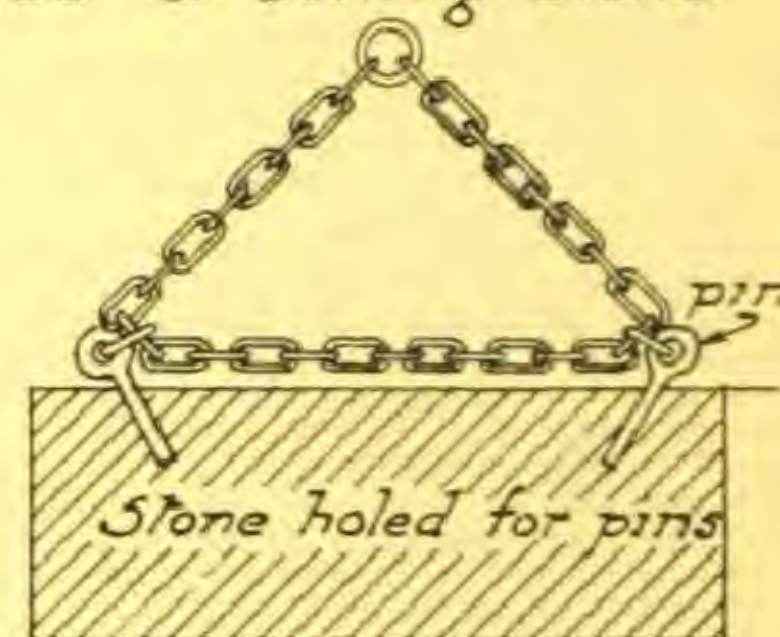
**THREE LEGGED LEWIS**  
consists of 2 dovetailed pieces and a centre parallel piece, connected with shackle and pin



CHAIN LEWIS



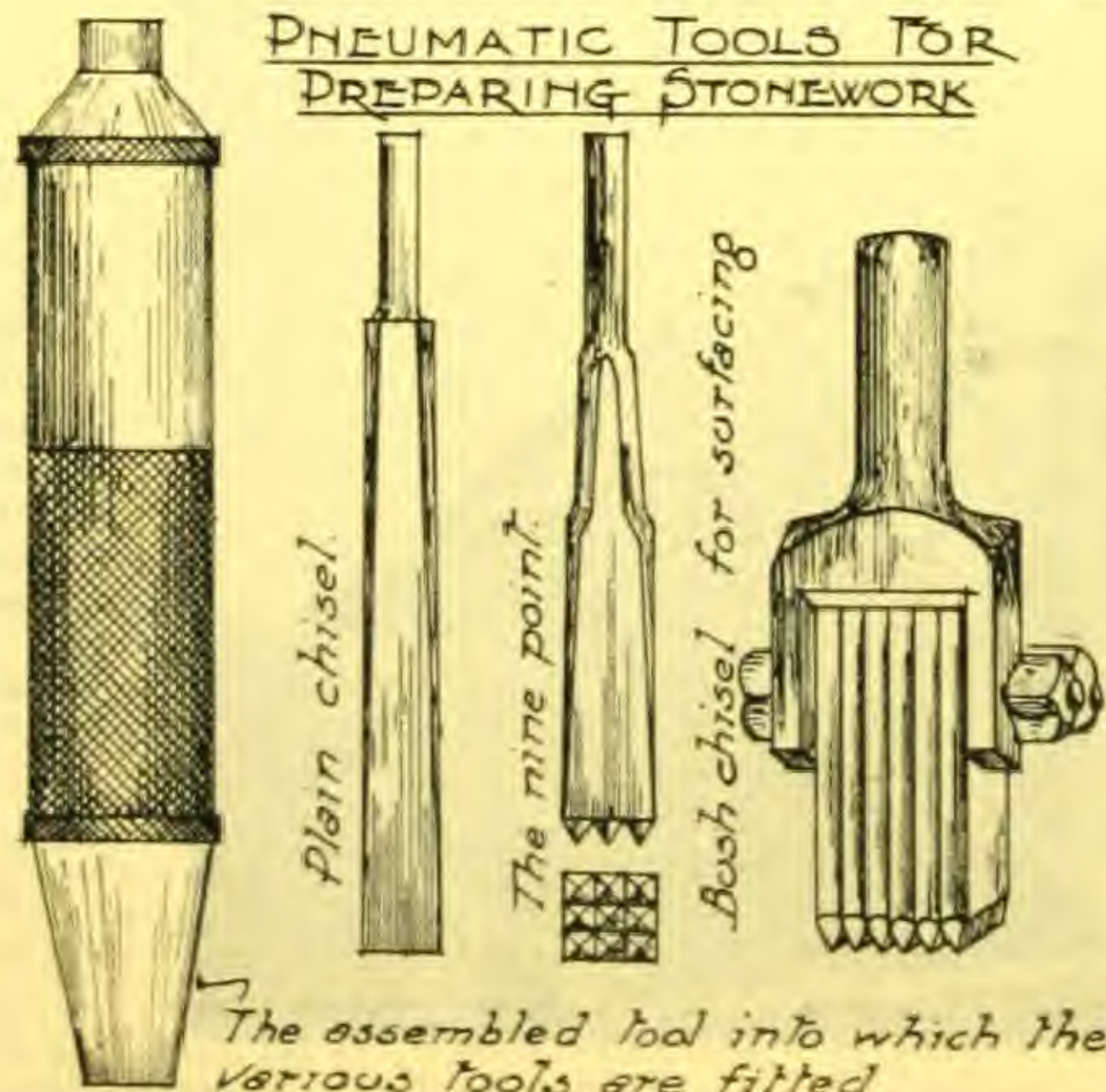
CHAIN DOGS



LIFTING PINS

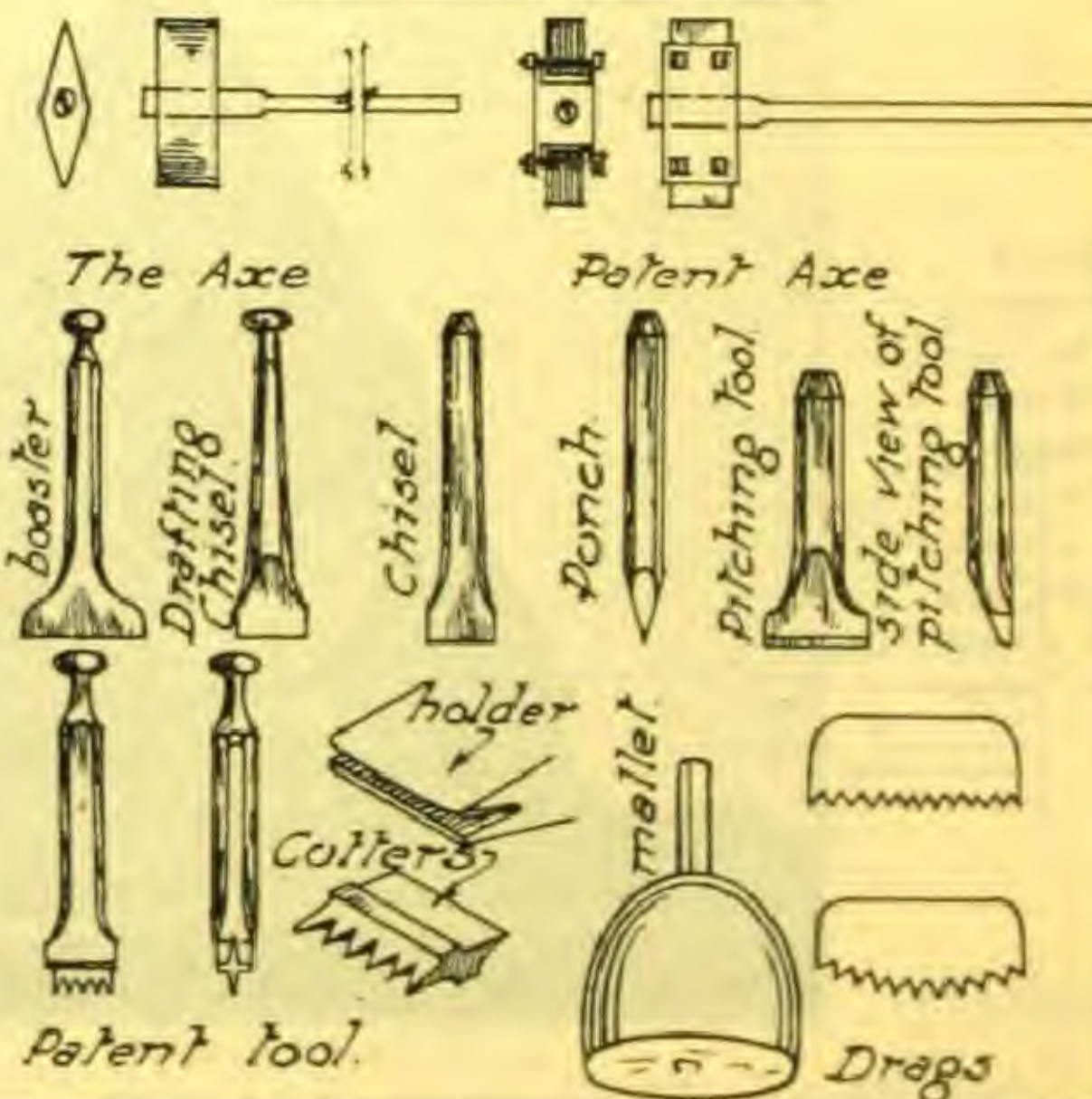
ALL MADE OF MILD STEEL

## PNEUMATIC TOOLS FOR PREPARING STONEWORK



The assembled tool into which the various tools are fitted.

## MASONS TOOLS





## MODERN STONE CUTTING AND DRESSING

Abrasive methods have largely replaced many of the hand operations of both Hardstones and Freestones; usually the same machines will dress both stones.

In the modern stone-cutting plant such as the Standard Quarries, the following and many other types of machines are available, thus making modern shop practice the means of producing high quality work at an economical rate.

Frame saws weighing about 10 tons are used for converting rough blocks of stone into slabs of required thickness. Any required number of blades up to 30, about 14 ft. long, are fitted into the frame, which is moved back and forwards under pressure, and instead of using teeth, steel shot is poured under the blade with water, and the abrasive action thus set up cuts through the hardest granite. The Carborundum machines have wheels of carborundum of different diameter and thicknesses to suit varying requirements, and travel at a periphery speed of 7,000 ft. per min. With a strong



Australia's Finest Public Building—Parliament House, Victoria—faced with Stawell Stone.

stream of water playing on the cutting edge, the stones to be dressed are forced down under these wheels by a moving table, and faces, beds, joints and mouldings are cut as required, giving a beautiful rubbed finish to either granite, trachyte, bluestone, marble or freestone. Polishing machines have a radial arm jointed in the middle and are fitted with iron discs which travel under pressure at 280 r.p.m. Abrasives are fed under the discs with water to reduce the face to the required finish.

Stone lathes, which will turn columns, bases, caps, balusters, etc., from 16 ft. long to 3 ft. 6 in. diameter down to 12 in. long and 3 in. diameter, and somewhat resembling engineers' lathes, are used; they are much heavier, and the cutting edge of the tool is formed like a saucer, which revolves as it comes in contact with the stone. An engineer's lathe or tools will not cut such stones as granite.

## GENERAL DESCRIPTION OF MASON'S TOOLS AND STONE FINISHES

The following data, nomenclature of finish and the description of the tools used to produce the effects, is presented for the use of those who desire a more intimate understanding of the preparation of stone for building purposes, and at the same time to show the comparison with stonework practice in England and America.

Different stones require different tools and machines, and can be roughly divided into hand work, which is cutting with chisels and axes, and power work, whereby abrasion with steel shot and carborundum, as described above, shapes and cuts the stone. In both cases many of the operations are preliminary to a finished surface.

Hand tools on granite, bluestone or trachyte are hammered headed and struck with a steel hammer.

**Punch** (see plate).—In America, called "Point"—used for removal of uneven surfaces.

**Chisels** (see plate).—For cutting level small faces such as a draft, which denotes the depth required to get a finished face.

**Single Axe**.—In America, called "Pean Hammer," in England, "The Axe"; used after the punch to reduce a face to a level slightly higher than the drafts.

**Dummy** (Australia only).—Is a hammer with a number of vee grooves cut in the solid on both ends, used for reducing to a finer level after the single axe.

**Patent Axe** (see plate).—In America, called "Bush Hammer"—used after the single axe or dummy, and results in a finish called "Patent Axed," being a series of fine marks usually running from top to bottom bed. If these marks are rubbed out it is called the "Rubbed Face."

**Pitching Tool** (see plate).—In America, called "the hand set"—used for spalling off waste stone.

When struck with a heavy striking hammer, the Pitching Tool is made much heavier and is called a Bull-set; the punch is then called a Bull-punch.

It will be noted that all these tools and preliminary workings have been used to produce a Patent Axed or Rubbed Face finish.

**Picked Face** finish consists of a multitude of stabs with a hammer sharpened like a punch, and is used after the punch.

**Exfoliated Face** is similar in appearance to Picked Face, but shows no tool marks, and is performed by subjecting the stone to a thin pencil point of heat. This is a patented process of the Standard Quarries.

**Rock Faced Finish**, as the name implies, is a natural finish; no labour is done to the face other than pitching it to a level line at beds and joints.

**A Diamond-hammer finish** is produced with a hammer with a number of pyramid points on each end, and gives a finer face than the "Pick," and is usually used after the Dummy.

**A Vermiculated Finish** (see plate), is made with drills, chisels and punches, and follows the single axe.

**Polished Face** is a process in granite or trachyte whereby all the surfaces are reduced to a very fine finish by the use of such abrasives as steel shot, carborundum grains, flour of emery, and is polished by oxides of tin, called putty powder, being rubbed on the face by heavy pressure felt.

All these finishes and preliminary labours are performed at the Standard Quarries by the use of compressed air-operated hand machine, drills and frame machines, operating pneumatic hammers, which strike 600 blows to a single blow made by the mason's hand. The tools used are a similar type to those used by the mason, but in the case of the punch, there are four and nine cutting points instead of the one. By this feature and by reason of the greater rapidity of blows made by compressed air-operation, labour costs are greatly reduced.

**Sandstone** is dressed by hand up to the "axe" stage of the hardstones by a wooden mallet (see plate), instead of a steel hammer, using mallet-headed chisels and punches (see plate).

**The Claw Tool** (see plate) consists of a number of teeth somewhat like those of a saw, cut in the blade of a chisel. When placed in a holder it will reduce the face from the punch like coarse saw marks, which is called "claw-tool finish."

**Boasters** are chisels, two inches or more wide, and follow the claw tool; the finish is called "Boaster Face."

**Rubbed Face** is a finish which is performed by rubbing out all tool marks with abrasives.

**Batted Face** is performed after the face is rubbed by striking a bladed chisel 3 in. to 4 in. wide with a light mallet. This finish is usually specified so many bats to the inch.

**Tooled Face** is somewhat similar to batted face, but the marks are more regular and deeper, and are usually specified "three bats to the inch."

**Broached Face** is a finish where a series of punched lines on parallel are sunk to the marginal drafts.

**Limestones**, such as Oamaru from New Zealand, Wairua Ponds, and Benara Limestones, are cut with saws and chisels somewhat similar to those used by a carpenter. The face is usually finished with the teeth marks of a small saw called a "Drag" (see plate). Sometimes the face is left Rock-faced.

(Continued on next page)



**THE STANDARD QUARRIES PTY LTD**  
WEARING STREET FOOTSCRAY, MELB. VICTORIA.

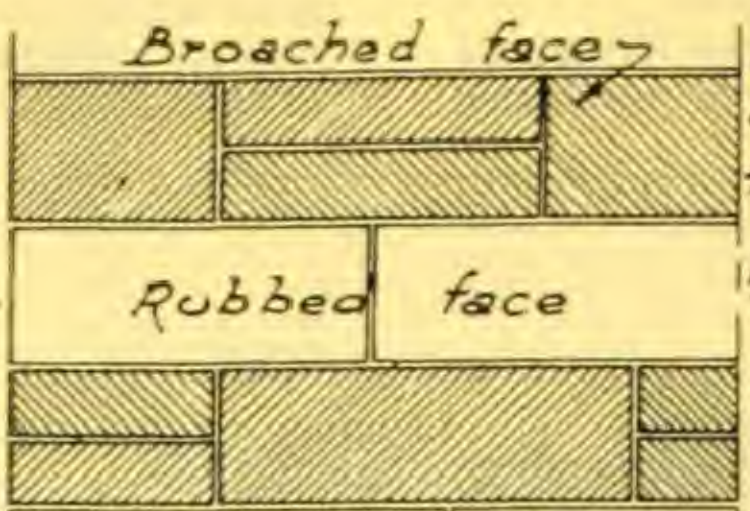
Broaching is the term given to a stone face left from the tool.

Chisel Drafted Margins.  
The marginal drafts are worked along four edges of stone - the centre being left rough or worked into various forms.

Boasted Faces.  
Are faces that show the tool marks and form of tool marks depends upon the style of the mason.

Picked Work.  
The surface is chiselled true and is then picked over with a mallet and sharp point.

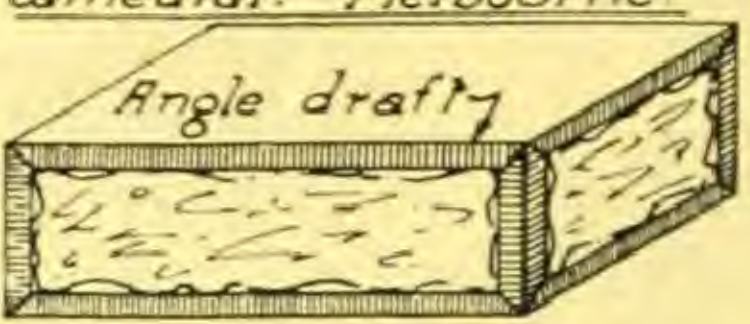
Tooled Faces.  
The faces are such that are left with regular chisel marks across the surface of the stone with a battling tool. When specifying tooling state number of lines or bats per inch.



Broached face

Rubbed face

Courses from St Pauls Cathedral, Melbourne.



Angle draft

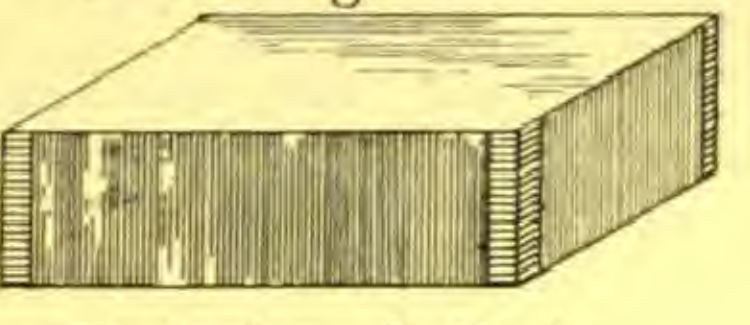
A fine example of broaching and rubbed work may be seen at St Pauls Cathedral, Melbourne.

Broached courses in  
Barrabool Hills Freestone.

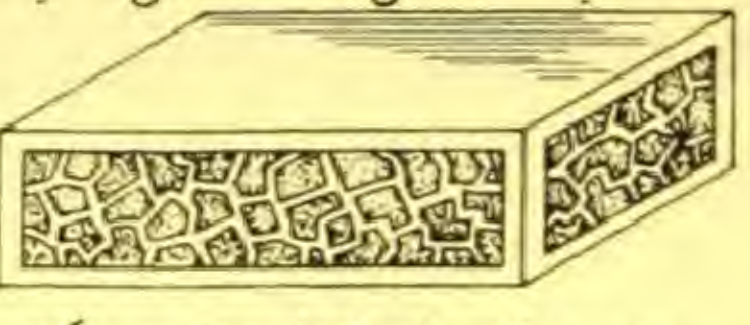
Rubbed courses in  
Warrn Ponds Freestone.

An example of Vermiculated work may be seen at The Houses of Parliament, Melb. The stone for the new Wing was carried out by The Standard Quarries Pty Ltd Wearing Street, Footscray.

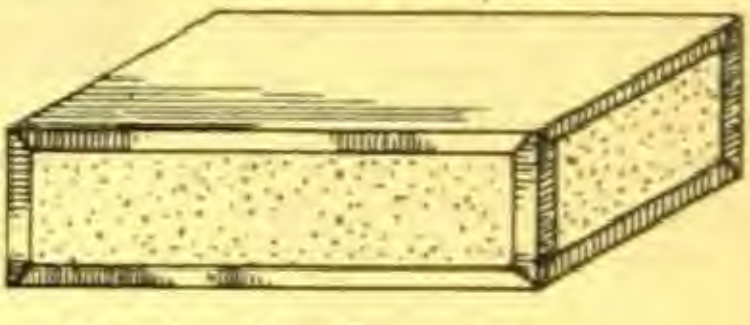
See The E.S.A. Bank Collins Street, Melbourne for an example of Picked Work.




Tooled or batted  
Claw Tooled



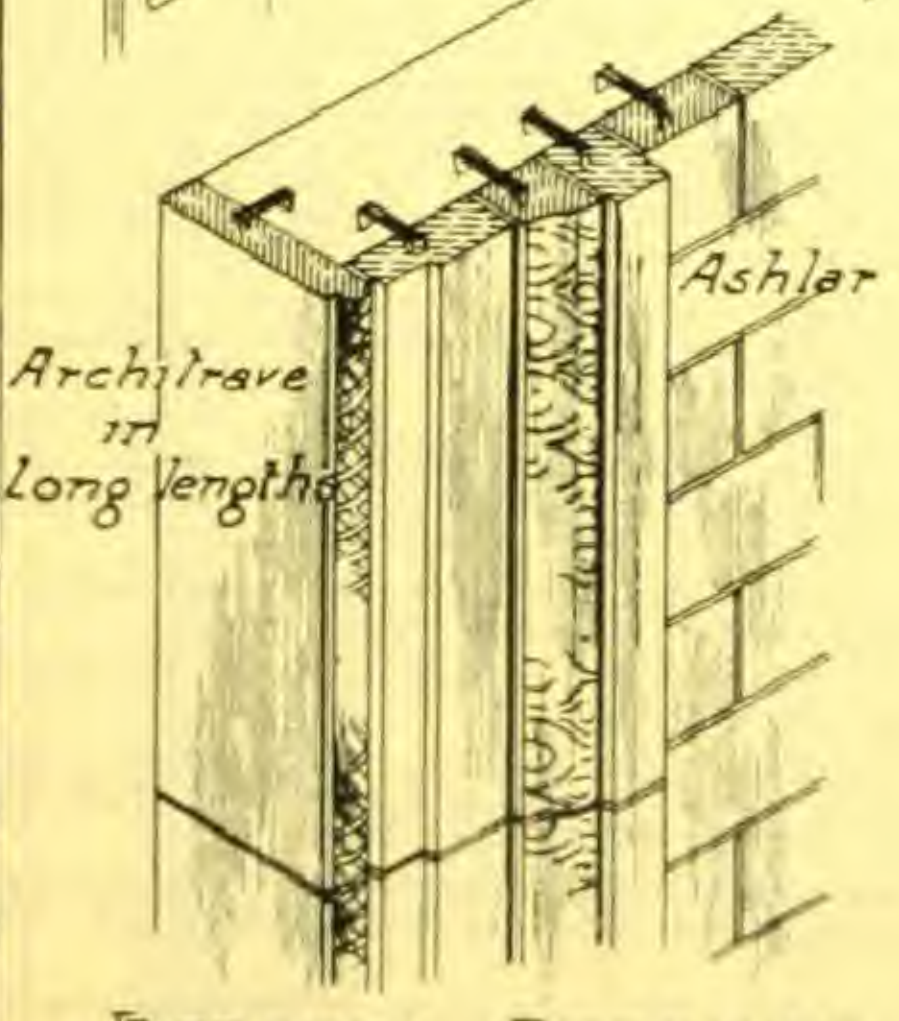
Vermiculated Quoin  
The stone has a series of sinkings, giving the stone a worm eaten appearance.



Picked Quoin.



Fluting in Granite Architrave  
Tooling cannot be done in granite.



Architrave in Long lengths

Ashlar

**NOTES FROM THE MELBOURNE CITY BUILDING REGULATIONS**

Ashlar facing shall not be less than four inches thick and securely anchored or bonded to the backing of concrete or brick as the case may be, the thicknesses prescribed for walls shall be inclusive of facing provided such facing is constructed to bond in not less than half brick thicknesses.

Fire-resisting materials for general purposes include flagstones not being exposed on the underside and not being supported at the ends only. Granite or other stone suitable for building purposes by reason of its solidity and durability.

No stone piers shall exceed in height eight times the least dimension of same if built of lime mortar and twelve times if built of cement mortar.

The safe bearing load for brickwork and masonry shall be taken at eight tons per square foot when lime mortar is used and at thirteen tons per square foot when cement mortar is used. The safe bearing load for ashlar masonry shall be taken at eight tons per square foot when lime mortar and fifteen tons per square foot when cement mortar is used and in the case of granite or basalt twenty two tons per square foot.

**ENTRANCE DOORWAY**  
**V.R.C. BUILDING, QUEEN ST. MELBOURNE.**

Note the method used in forming reveal which is done in Red Gabo Polished Granite.



## DESCRIPTION OF STONework AS SEEN IN MELBOURNE BUILDINGS

BUILDING.	POSITION.	MATERIAL BASE.	FINISH.	MATERIALS. SUPERSTRUCTURE.	FINISH.
A.M.P.	Collins & Market Sts.	Casterton Red Granite	Exfoliated	Sydney Freestone	Rubbed, Sawn, Clawed
Assembly Hall	Collins St.	Bluestone	Rubbed	Barrabool Hills Rubble, Sydney Dressings	Rock, Rubbed
Bank of Australasia	Collins & Queen Sts.	Malmsbury	Tooled Margin, Axed	Oamaru Limestone	Dragged
Bank of N.S.W.	Collins St.	Bluestone		White Tasmanian Freestone	Rubbed
Collins House	Collins St.	Trachyte	Polished	Wangaratta Granite	Rock-faced, Axed
City Court House	Russell St.			Moorabool Freestone, G'long	Rock-faced and Rubbed
Commonwealth Bank	Collins St.	Orbost Granite	Polished	Trachyte Cols., Sydney Freestone	Polished, Rubbed
E.S. & A. Buildings— Original	Collins & Queen Sts.	Bluestone		Sydney Freestone	Rubbed and Diamond- Hammered
Old Stock Exchange	Collins St.	Bluestone		Sydney Freestone	Rubbed
Equitable Buildings	Collins St.	Phillip Island Granite	Polished	Harcourt Granite	Polished and Picked
Colonial Mutual Buildings				Phillip Island Cols.	Polished
Flinders St. Railway Station	Flinders St.	Bluestone	Picked, Axed, Polished		
		Harcourt Granite			
Flinders Way	Flinders Lane	Dandenong Granite	Polished	Stawell, Coloured	Rubbed
Harbour Trust Buildings	Market St. & Flinders L.	Harcourt Granite	Polished	Stawell Freestone	Rubbed
Law Courts— Original	William & Lonsdale Sts.	Malmsbury	Rubbed	Tasmanian Freestone	Rubbed
New Block	Lonsdale St.	Malmsbury	Rubbed	Stawell	Rubbed
McEwan House	Little Collins St.	Trachyte	Polished		
McIlwraith, McEacharn	William St.	Malmsbury Bluestone	Rubbed	Sydney Freestone	Rubbed
National Bank	Collins St.	Harcourt Granite	Axed, Polished Columns	Hawkesbury River Freestone	Rubbed
National Mutual Insurance	Collins & Queen Sts.	Harcourt Granite	Picked Panels and Polished Faces	Sydney Freestone	Rubbed
Northern Assurance Co.	Collins St.	Bluestone	Rubbed	Stawell	Rubbed
Parliament House— Original; Back Front and Sides	Rear of Spring St. Spring St.	Bluestone Bluestone	Rock-faced and Tooled Diamond Hammered and Tooled Margin	Bacchus Marsh Freestone Stawell Freestone	Rubbed Rubbed
Post Office— Original	Elizabeth & Bourke Sts.	Gabo Island Granite	Rock-faced and Margins	Tasmanian Freestone	Rubbed
New Block	Elizabeth St.	Gabo Island Granite	Rock-faced and Margins	Stawell Freestone	Rubbed
Public Library— Original	Swanston St.	Malmsbury	Rubbed	Tasmanian White Freestone	Rubbed
South Annexe	Swanston St.	Malmsbury	Rubbed	Stawell White Freestone	Rubbed
Extension	Russell & Lonsdale Sts.	Bluestone	Rubbed	Stawell Freestone	Rubbed
Queensland Insurance	William St.	Bluestone	Rock	Sydney Freestone	Rock-faced, Rubbed, Boasted
Queensland National Bank	Collins St.	Trachyte	Rock-faced, Axed, Polished		
Sargent's Buildings	Collins St.	Bluestone	Axed	Stawell	Rubbed
Southern Insurance Co.	Collins St.	Bluestone	Axed	Stawell	Rubbed
St. Patrick's Cathedral	Eastern Hill	Bluestone	Rock-faced	Bluestone, Tasmanian Freestone Dressing	Rock-faced, Rubbed
St. Paul's Cathedral	Swanston & Flinders St.	Bluestone and Sydney Freestone	Rubbed	Barrabool Hills Ashlar, Waurin Ponds Dressing, Inside— Malmsbury Bluestone Sydney Freestone	Broached Rubbed Rubbed Rubbed
State Savings Bank — Head Office	Elizabeth St.	Harcourt	Polished	Stawell	Rubbed
T. & G. Buildings	Collins St. & Collins Pl.	Harcourt Granite	Polished, Axed, Slotted		
Taxation Offices	Lonsdale St.	Harcourt Base	Slotted and Polished	Stawell Freestone	Rubbed
Town Hall— Original	Collins & Swanston Sts.	Bluestone	Rock-faced, Tooled Margins	Tasmanian Freestone	Rubbed
Administration Block	Collins & Swanston Sts.	Bluestone	Rock-faced, Tooled Margins	Stawell Freestone	Rubbed
New Annexe	Collins & Swanston Sts.	Bluestone	Rock-faced, Tooled Margins	Stawell Freestone	Rubbed
Treasury Buildings	Spring St.	Bluestone	Patent Axed	Bacchus Marsh	Rubbed Note—Being restored with Stawell Stone
University— Ormond College	Parkville	Bluestone		Barrabool Hills Ashlar, Waurin Ponds Dressings Waurin Ponds Freestone	Rock-faced, Rubbed Rubbed
Queen's College	Parkville	Bluestone	Rock-faced and Rubbed	Barrabool Hills	Rock-faced and Rubbed
Newman College	Parkville	Bluestone	Rubbed	Hunter Hills, Sydney	Rubbed
Wilson Hall	Parkville	Bluestone	Rock	Redesdale Freestone	Rubbed
Arts Buildings	Parkville	Bluestone			
V.R.C. Building	Queen St.	Harcourt Granite	Slotted	Red Gabo Granite Doorway	Polished

Note.—Boldface type indicates that stone was supplied and, in certain cases, supplied and dressed by Standard Quarries.

## STONE PAVING AND WALLINGS

One of the latest developments in stone paving and wallings in buildings is the use of veined, coloured Stawell stone. It is composed of granitic sand, and the crushing strength exceeds that of Harcourt Granite by 53 per cent. Outstanding characteristics of this sandstone are its great resistance to wear, and its provision for non-slipping foothold. Its colouring does not permit the appearance of dust and dirt stains.

Numerous tests were applied before this stone was selected as the flagging for the main chamber of the new A.M.P. Building, and for the dado and stairways of the new Equity Trustees Building. It is also specified for the Electricity Commission's new building in Flinders Street.

(Continued on next page)

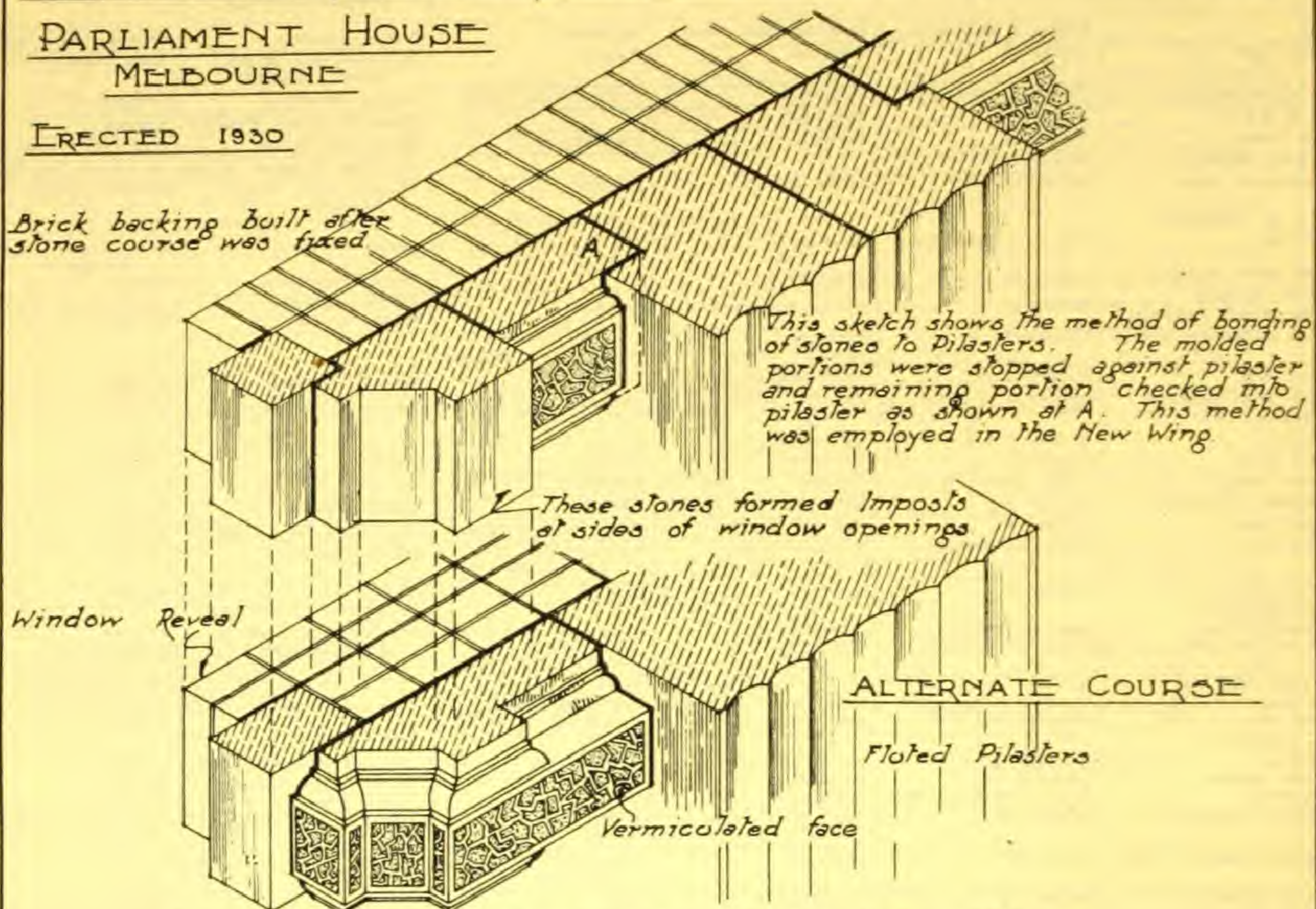


# WINDOW REVEAL STONE BONDING *Alternate courses.*

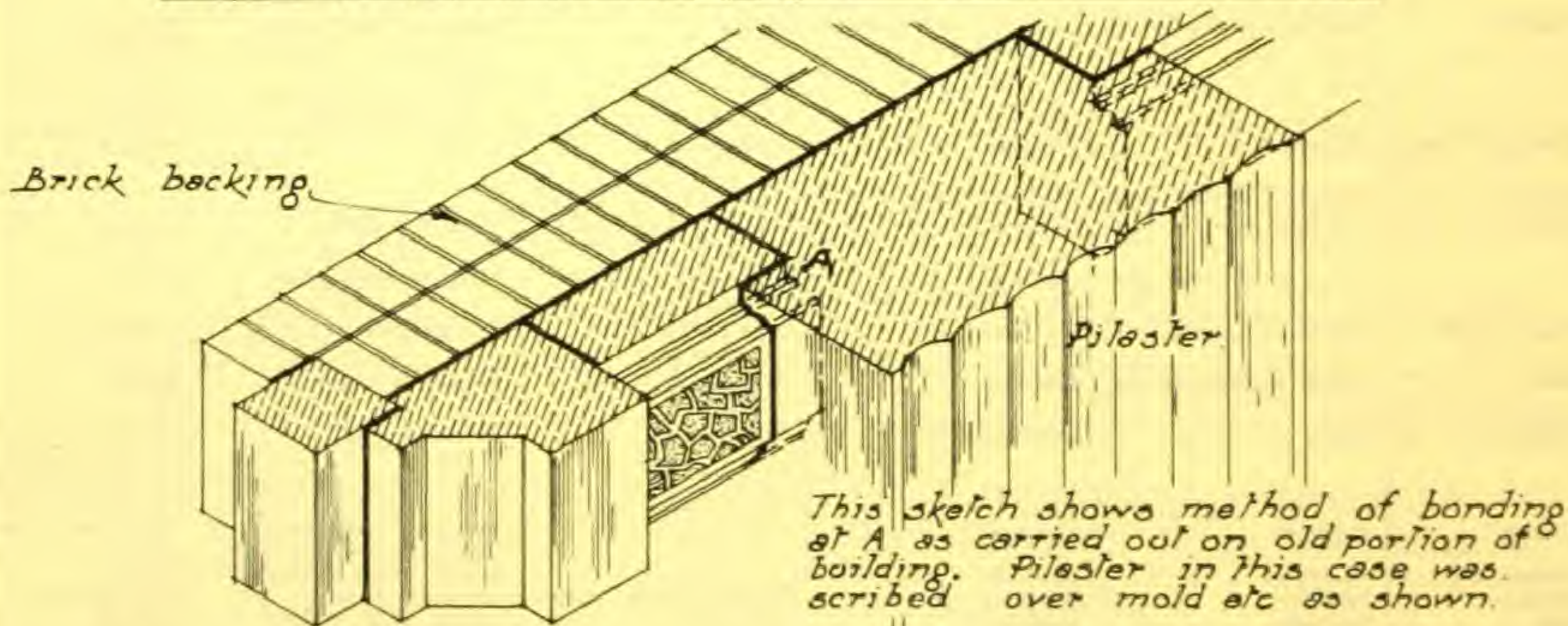
## PARLIAMENT HOUSE MELBOURNE

ERECTED 1930

*Brick backing built after  
stone course was fixed*



### BONDING AS CONSTRUCTED IN NEW WING



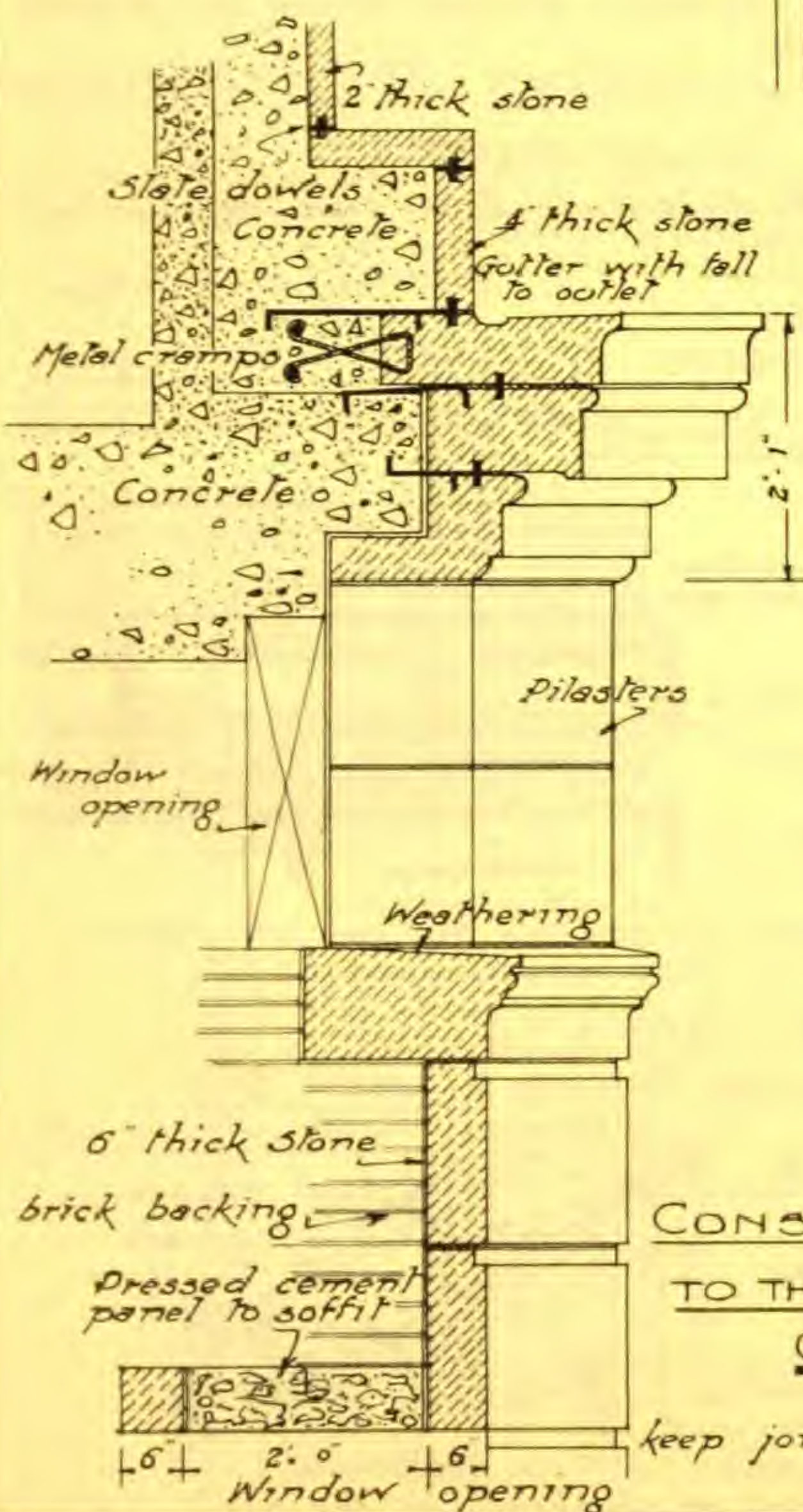
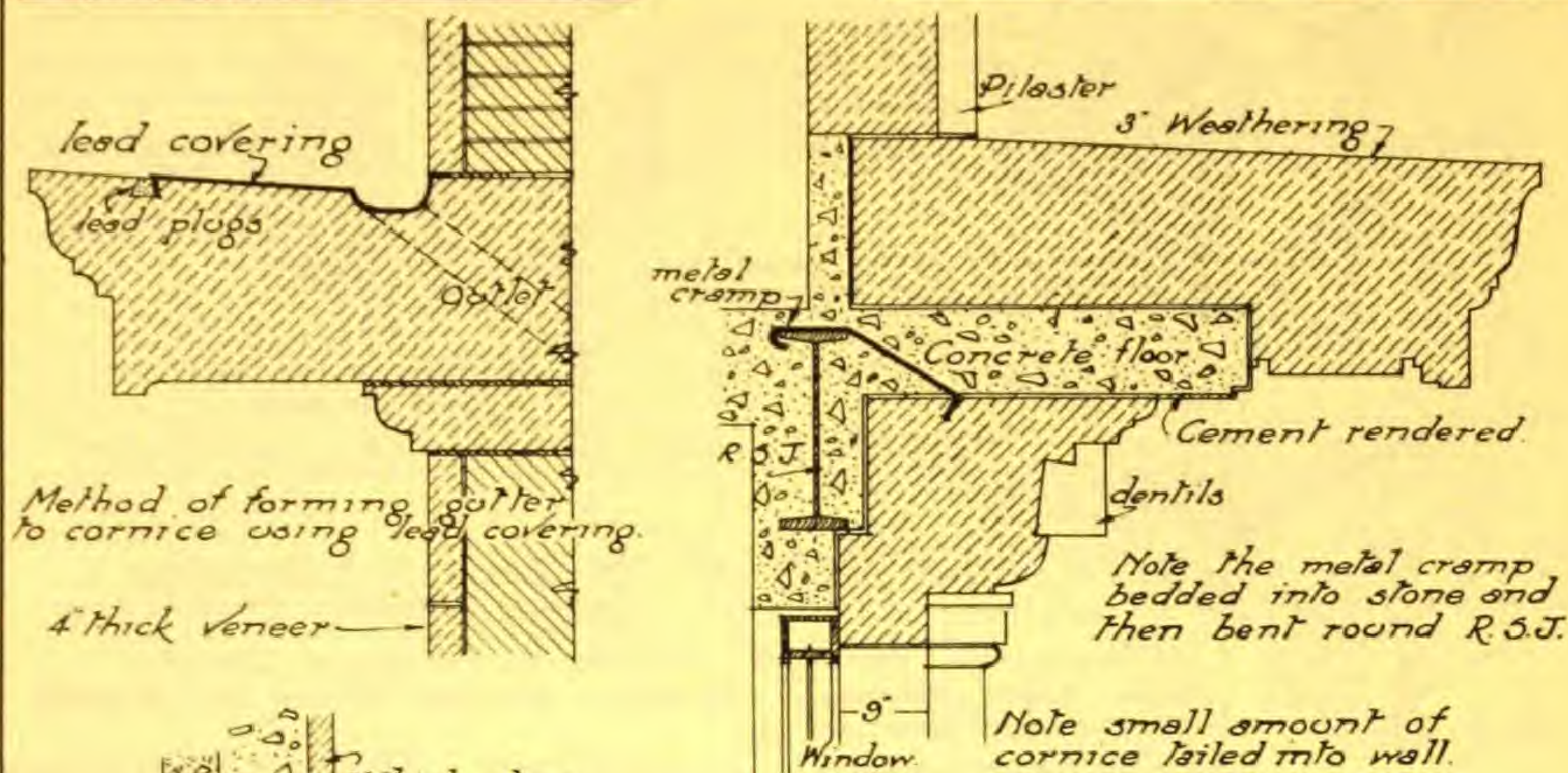
### BONDING AS CONSTRUCTED IN OLD PORTION

THE STONEWORK FOR THE NEW WING WAS CARRIED OUT BY  
STANDARD QUARRIES PTY. LTD.

*The stone used in the construction of the New Wing at Parliament House Melbourne, known as Stawell Stone was obtained from the Quarries of the Standard Quarries Pty Ltd. The Quarries are situated in the Grampians and about 16 miles from Stawell.*



WORKS CARRIED OUT BY  
THE STANDARD QUARRIES PTY LTD  
Stone supplied-cut and set.  
FOOTSCRAY MELBOURNE



METHOD OF ANCHORING IN  
MAIN CORNICE OF  
THE STATE SAVINGS BANK  
ELIZABETH STREET MELBOURNE

The stonework for the New Wing of the State Savings Bank was carried out with Stawell Stone obtained from the Quarries of the Standard Quarries Pty Ltd which are situated in the Grampians about 16 miles from Stawell

The stone used in the New building for the Australian Mutual Provident Society, Collins Street Melbourne is Sydney freestone.

The stonework for these two buildings was carried out by  
THE STANDARD QUARRIES PTY LTD

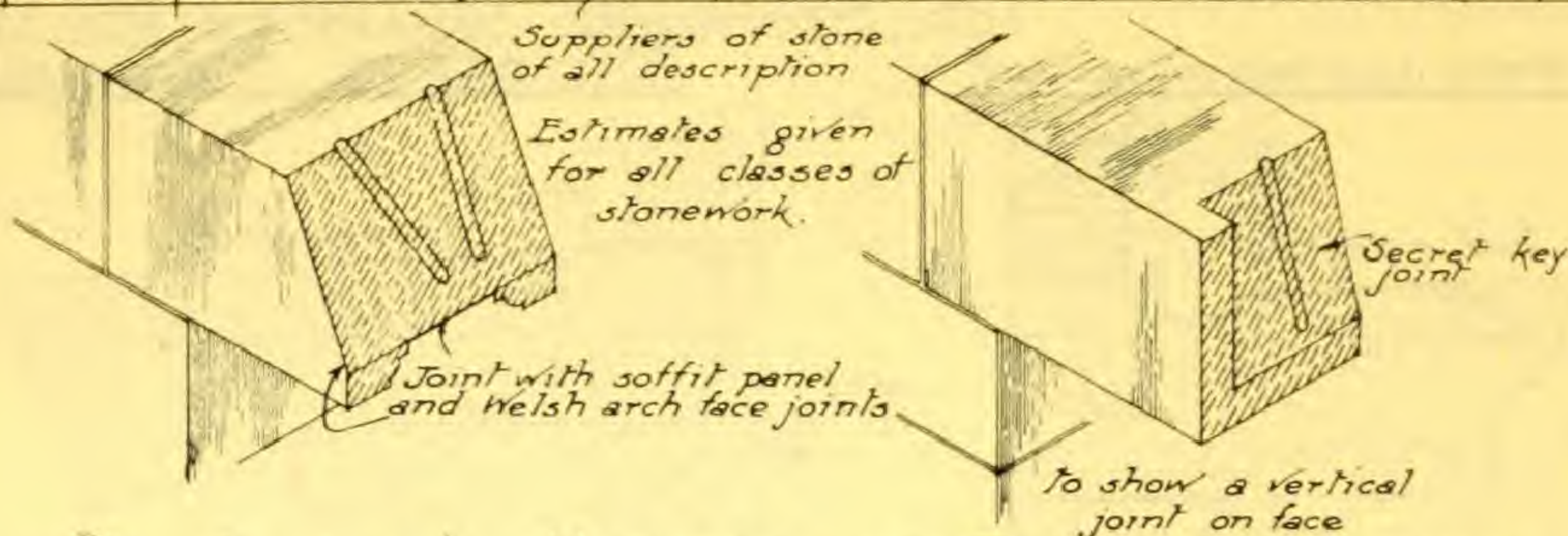
WEARING STREET  
FOOTSCRAY.

CONSTRUCTION OF CORNICE  
TO THE NEW A.M.P. BUILDING  
COLLINS STREET MELBOURNE

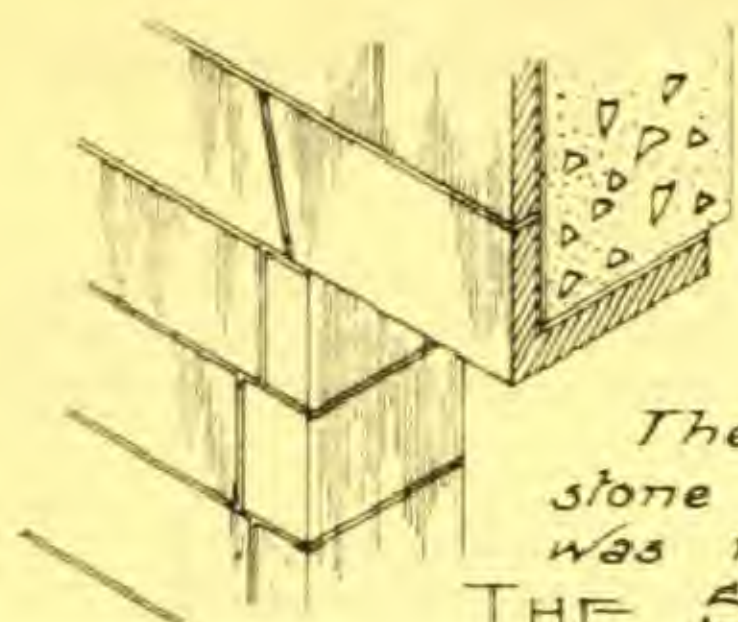
keep joint on top of rustications



## THE STANDARD QUARRIES PTY LTD FOOTSCRAY



## METHODS OF FORMING LINTOLS



A typical lintol of the New A.M.P. Building,  
Collins Street, Melbourne

The stone facings to this building is 'Bondi' stone from Sydney. The stone facings which are 4 1/2 thick was worked and set by

THE STANDARD QUARRIES PTY LTD, FOOTSCRAY

## TOWN HALL, MELBOURNE.

The stonework for the New Wing to the Melbourne Town Hall was carried out by THE STANDARD QUARRIES PTY LTD

WEARING STREET  
FOOTSCRAY

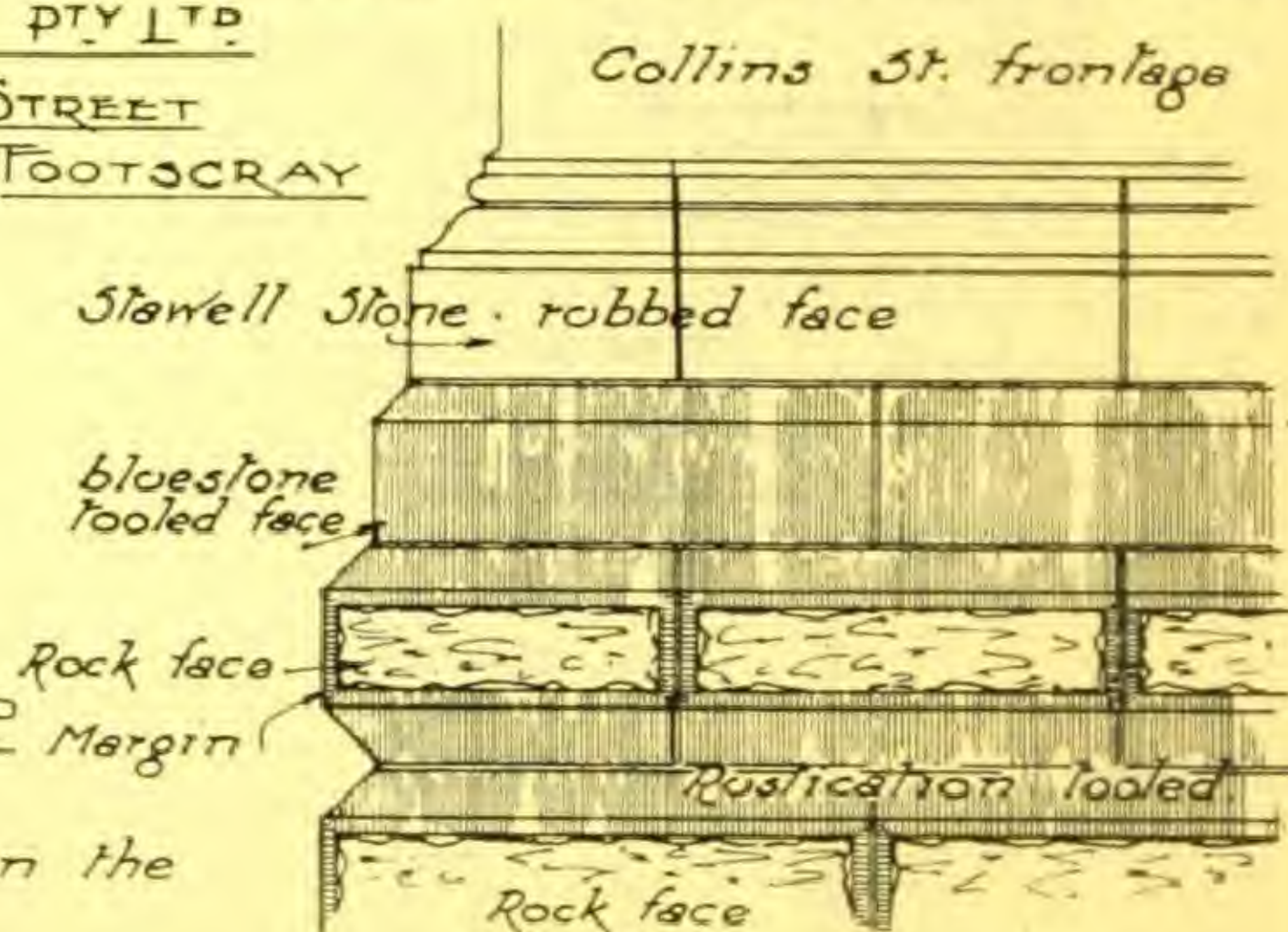
The Stawell Stone used for the Super-Structure was obtained from the Quarries of the Standard Quarries Pty Ltd. These Quarries are situated in the Grampians about 16 miles from Stawell.

The bluestone used for the base was procured from

THE STANDARD QUARRIES PTY LTD  
FOOTSCRAY

When specifying tooled work mention the number of bats to the inch.

Tooling can be done on freestone, bluestone or marble but not on granite.

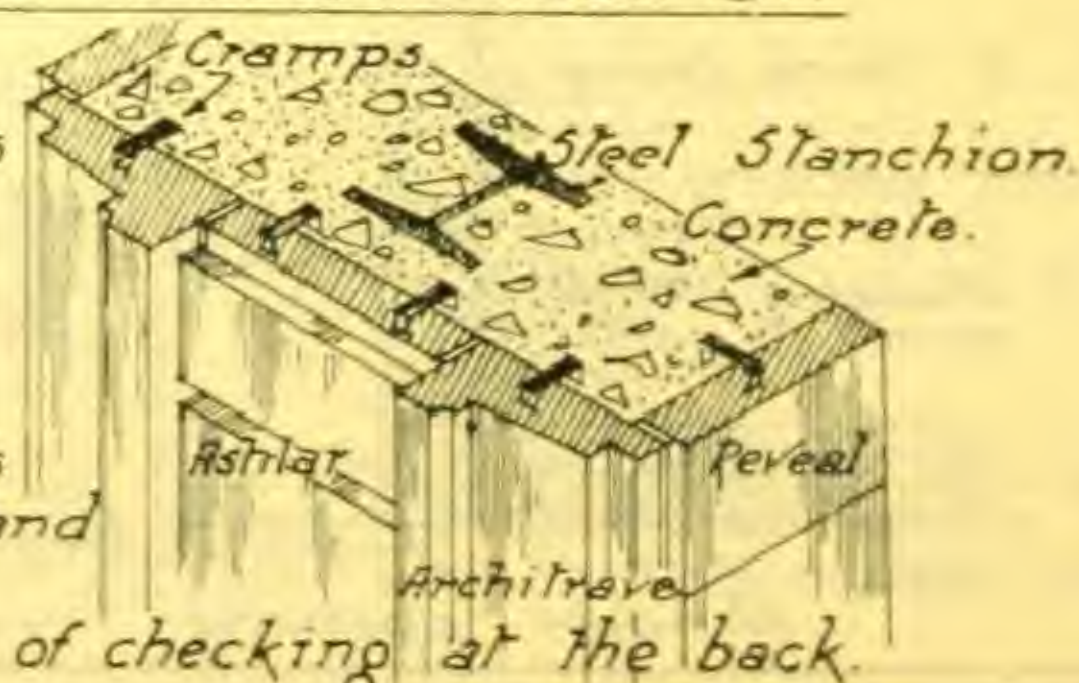


## POLISHED GRANITE

AS JOINTED ON YORKSHIRE HOUSE, QUEEN ST.

The granite construction to this building is known as Veneer Ashlar. Stones of not less than 4 thick are allowed under the City Councils Regulation. The stone is fixed after the concrete is completed and is held to concrete with metal cramps as shown.

Note the method employed in forming reveals by a break of about 4 in the reveal stone. This and similar methods employed by the Standard Quarries Pty Ltd, obviate the costly procedure of checking at the back.



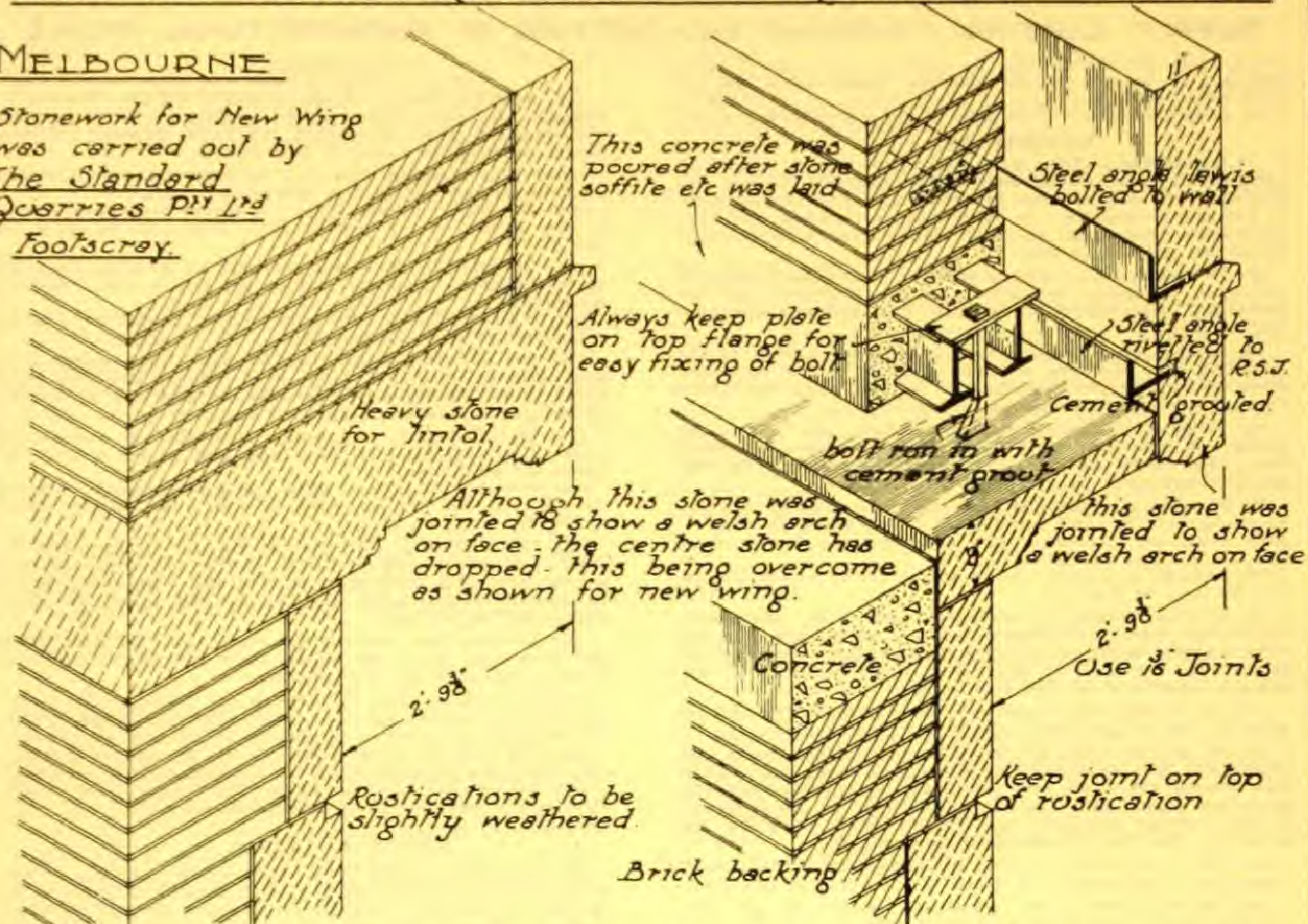


## STONE CONSTRUCTION PARLIAMENT HOUSE

## MELBOURNE

Stonework for New Wing  
was carried out by  
The Standard  
Quarries Pty Ltd

Footscray

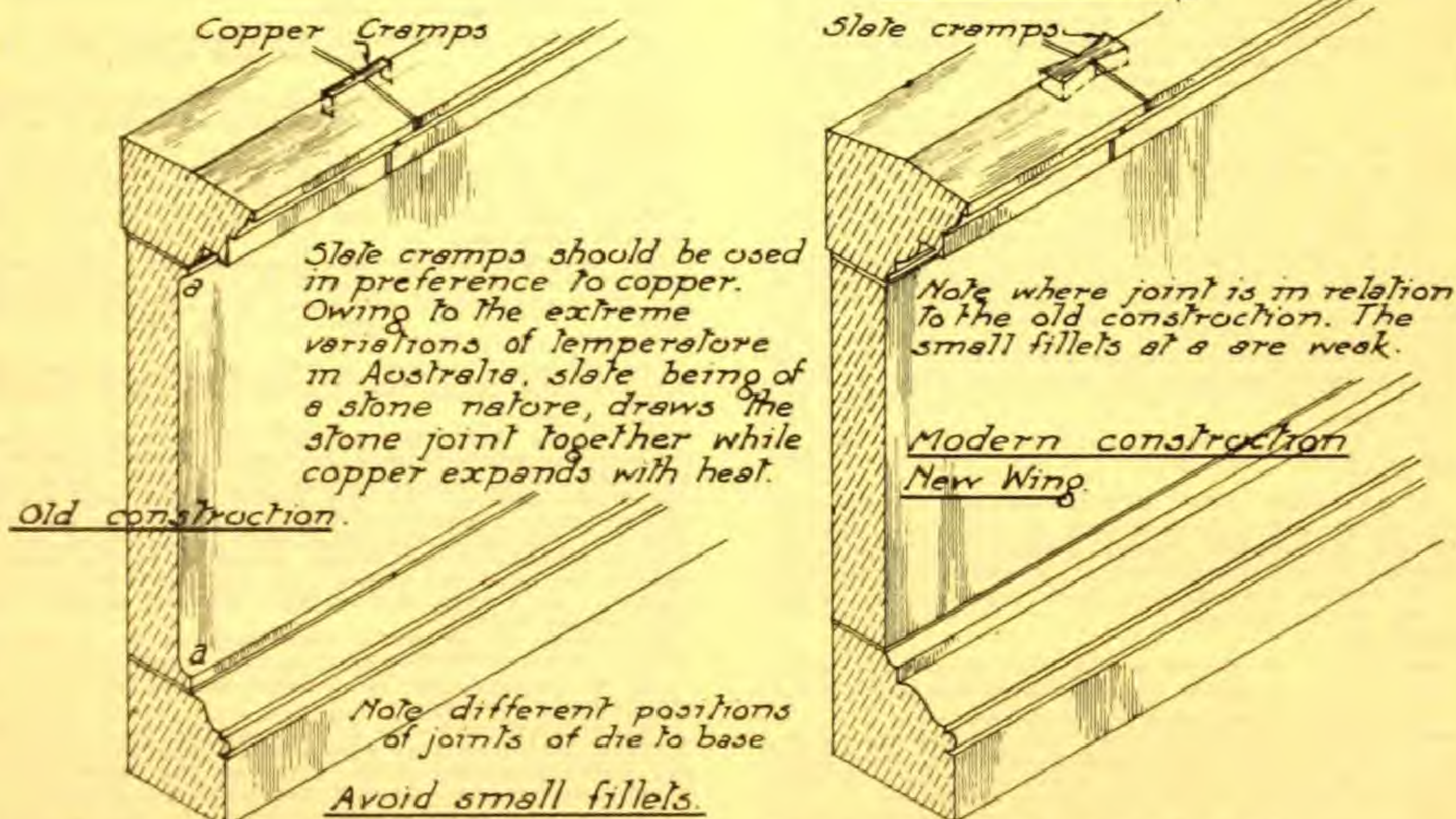


## METHODS OF SUPPORTING STONES BETWEEN COLUMNS

## OLD CONSTRUCTION

## MODERN CONSTRUCTION

## NEW WING



## BALUSTRADE CAPPING AND DIES UNDER



## SPECIFICATION FOR THE SUPPLY, CUTTING, FINISHING AND SETTING OF ARCHITECTURAL STONE

**Note.**—This Specification may be used in whole or in part, depending on whether the sub-contractor, supply and/or cut and finish and/or set.

Use paragraphs which directly apply to the various kinds of stone.

### MATERIALS.

(1) **GENERAL.**—The later specified stones shall be obtained from approved well-known quarries having the facilities and capacity for providing the quality and sizes of the stone required. In submitting estimates, the sub-contractor shall state name of stones, and quarries upon which his price is based.

(2) In quarrying all blocks shall be so selected that any variation in colour permitted by the architect will be uniformly distributed throughout the exposed surfaces and walls.

(3) **SAMPLES.**—The sub-contractor shall submit to the architect two samples of each kind of stone required, showing the extreme variations in the stone of which the sub-contractor proposes to provide.

(4) **FREESTONES.**—Freestones shall be absolutely sound and free from sand holes, discolourations and open beds, and shall be in all respects equivalent to the samples approved by the architect.

(5) Provide all material and labour and carry out all finishing, setting, and completion of all work in accordance with the drawings, the specifications herein, and the following schedule:—

**Note.**—Include in schedule the thicknesses of the various portions that are to be in Freestone.

(6) **LIMESTONES.**—Limestones shall be absolutely sound and free from discolourations, open beds, and all other defects which would mar its strength, durability or appearance. It shall be equivalent in all respects to the samples approved by the architect.

(7) Use paragraph 5 and include detailed schedule of work to be in Limestone (including thicknesses).

(8) All granite shall be of compact structure, hard and practically non-absorbent with exposed faces reasonably free from black spots and white veins. Granite shall be (mention colour and texture) and equal in all respects to the sample approved by the architect. Granite for polishing shall be of a selected dark colour.

(9) Use paragraph 5 and include detailed schedule (including thicknesses) of work to be done in Granite).

(10) **BLUESTONE.**—All bluestone shall be of fine texture, free from corks and honeycombs.

(11) Use paragraph 5 and include detailed schedule of work to be in Bluestone.

### CUTTING AND FINISHING.

(12) **CUTTING AND SETTING DRAWINGS.**—The sub-contractor shall prepare and submit to the architect for approval, complete cutting and setting drawings for all stones under this contract. No stone shall be cut until these drawings have been approved by the architect. Such drawings shall show by number or letter the position and dimensions of every stone, together with typical examples of joggles, dowelling, cramping and anchoring.

(13) **CUTTING.**—All stones shall be accurately cut to shape and dimensions with jointing, as shown on the approved cutting and setting drawing. Beds and joints shall be at right angles to the face unless otherwise shown. Patching or hiding of defects will not be permitted.

(14) Unless otherwise specified, all stones shall be cut so that they may be laid on their natural bed.

(15) Freestones and limestones for cornices and copings shall be cut so that they may be joint bedded (that is, the natural bed of the stone is vertical, instead of horizontal), thus presenting to the weather, faces at the front, top and soffit, none of which are bedways. The return stones of these copings and cornices shall be cut with diagonal bed-joints so that when they are joint bedded there will be no appearance of a face bed on the return side.

**Note.**—The above paragraph re cornices and copings does not apply to Stawell Stone, owing to its great compressive strength and density.

(16) **CUTTING FOR LEWIS HOLES, DOWELS, ANCHORS AND CRAMPS.**—Cut all holes and sinkings for the Lewis bolts, dowels, anchors, and cramps, as required in this specification, or as shown on drawings.

(17) **MITRE ANGLES.**—No mitre angles will be allowed in any part of the work.

### BONDING

**Note.**—If it is the intention to bond stone facing to the backing without the use of anchors, etc., the following will apply:

(18) Ashlar facings shall be cut so that every..... course will be a bonding course with not less than a 4in. bond into backing. All projecting stonework shall have beds in the wall so that the centre of gravity of each stone will be well within the face of the walls.

**Note.**—Ashlars facings that are bonded to walls are not permitted to be less than 4in. thick. If anchored, they may be of a lesser thickness as set out in the recommended table on page 44.

### FINISHES.

(19) **FREESTONES AND LIMESTONES.**—Generally, exposed surfaces, except where tooling or other finishes are specified, shall be smooth machined dressed (rubbed face), showing no signs of tool marks.

(20) Other finishes (or any variation to the above) shall be as set out in the following schedule:—

**Note.**—If required, prepare schedule indicating the various finishes to other portions of the work, or any variations to the above—see page 46.

(21) **GRANITE.**—Exposed surfaces of granite shall be as indicated on drawing, and as set out in the following schedule:—

**Note.**—Prepare schedule, indicating various finishes to different portions of the work—see page 46.

(22) All polished faces shall be free from winds and shall consist of a fine, even glass surface polished with oxide of tin (putty powder) with no addition of Spirits of Sorrell or Muriatic Acid.

(23) **BLUESTONE.**—Exposed surfaces of bluestone shall be as indicated on drawings, and as set out in the following schedule:—

**Note.**—Prepare a schedule as before. Most of the finishes (excepting polishing) that can be applied to granite can also be applied to bluestone—see page 46.

(24) **MOULDINGS.**—All mouldings and arrises shall be clean and sharp and in strict conformity with details; curves shall be uniformly continuous when assembled. Re-entrant angles shall be cut from the solid; no mitre joints will be allowed.

(25) **CARVINGS.**—No carved work shall be done from the drawings, but from plaster cast prepared from clay models approved by the architect.

Sufficient stock shall be left for the carving. The carving shall be carried out in strict conformity to the models by professional carvers approved of by the architect.

Carving may be done either on the ground or in position after the building is up, as directed by the architect.

(26) **SILLS.**—All window sills shall be in one stone each and weathered as shown on drawings.

### STONE SETTING.

(27) **SETTING MORTAR.**—Mortar for setting Freestone, Granite, and Bluestone shall consist of three parts of clean, sharp, well-washed sand to one part of Portland cement. Mortar for setting Limestone shall consist of four parts of clean, sharp, well-washed sand, two parts of hydrated lime, or well-slaked lump lime, and one part of Portland cement, which shall be added on the mortar board.

(28) **SETTING.**—All stone work shall be set as shown on the approved "Cutting and Setting" drawings.

Before setting, all stone shall be cleaned with a fibre brush and drenched with water.

(29) Bonded ashlars facing shall be bonded into the backing every.....course with not less than a 4in. bond, or

(30) Anchors may be substituted for bonding courses if spaced to provide an anchor every 2 sq. ft. of wall surfaces.

(31) Each stone shall be bedded in a full bed of mortar with beds and vertical joints 3/16th in. thick.

Mortar shall be raked out 3in. from the face of the joints for pointing.

(32) **POINTING.**—After the completion of facing, the work shall be carefully cleaned down and the joints raked out, thoroughly wetted with water, and carefully pointed with.....(name pointing mortar) to the architect's satisfaction.

(33) **ANCHORS, DOWELS, ETC.**—Provide and set all metal anchors, dowels, and cramps necessary to secure all cut stone.

(34) Unless otherwise specified, cramps and anchors for securing ashlar facings shall be as follows:—Stones up to 2in. thick shall be secured by 1in. diam. brass or galvanized anchors, one end turned down into stone and the other cramped to hold in the backing. Stones over 2in. and up to 4in. thick shall be anchored with 1 x 1/2 in. galvanized iron cramps, shaped to fit the cramp holes in the stone and with a right angle bend fitted into backing. All cramps and anchors shall be grouted in with cement mortar.

**Note.**—Include in specification special anchorage for projecting cornices, columns, balustrades, etc.

(35) All copings shall be cramped at the joints with approved slate cramps.

(36) **PROTECTION.**—All stone work shall be protected by the general contractor during the progress of the work and until completion of the building. No timber shall be used that in any way will stain or deface stonework.

(37) **SCAFFOLDING AND CENTREING.**—The general contractor shall provide all necessary scaffolding, centreing, staging, etc., required for setting and carving.





# WUNDERLICH LIMITED

Manufacturers of

## WUNDERLICH TERRA COTTA

Administration: BAPTIST STREET, REDFERN, SYDNEY, N.S.W.

Showrooms and Offices:

SYDNEY: Baptist Street, Redfern.

STH. MELBOURNE: 210 Hanna Street.

ADELAIDE: Grote and Morphett Streets.

PERTH: Lord and Short Streets.

BRISBANE: Amelia Street, Valley.

NEWCASTLE: Builders' Exchange, King St.

HOBART: 139 Macquarie Street.

LAUNCESTON: 71 St. John Street.

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S.A.A. File No.

[For Other Products, See Pages 22, 93, 102, 176 and 240]

### Description

Broadly speaking, Wunderlich Terra Cotta is a burned-clay product, usually with a glazed face, made specially for a pre-determined position on a building. In its simplest form (i.e., as ashlar), it may be described as blocks of burned clay, about 4 inches thick, left hollow at the back.

### An Ideal "Facing" Material

The general use of Wunderlich Terra Cotta is as a "facing" for buildings; but it is employed, also, to enrich a facade of another standard material, such as brick or stone; or as a decorative element in the treatment of building interiors.

### Wide Palette of Colours

Wunderlich Terra Cotta excels all other "facing" materials in the almost limitless palette of rich colours it offers for the architect's selection. There are available to-day the natural burned clay finishes—mainly shades of red, chocolate, buff and grey; also glazed effects, of either dull matt or lustrous appearance. These colours range from milky white and cream tints to brilliant yellows, warm browns and bronze; from emerald to dark greens; and from delicate lavenders to bright or deep blues. Furthermore, there are mixed colours, harmonising closely with natural geological formations. Individual blocks may partake of one colour only, or any combination of colours.

### Economy of Ornamental Treatment

Being plastic by nature, Wunderlich Terra Cotta will respond to any scheme of moulded or modelled ornamentation the architect may impose; and where decorative detail repeats in the design, this material will be found decidedly economical, as once the original model of each repetitive unit has been completed, the ornamental blocks can be duplicated with virtually the same facility as plain work.

### Permanent—and Always Clean

The durability of Wunderlich Terra Cotta is unquestioned. Even when subjected to the intense heat of a conflagration, this material remains unaltered. Its glazed surface offers no lodgment for smoke or dust; hence every shower of rain restores the pristine cleanliness of the surface.

### Suited to Modern Construction

Wunderlich Terra Cotta is readily anchored to concrete or bonded in with brickwork. As it is merely a "shell," and therefore lighter in weight than solid materials, it imposes only a minimum load on the structural elements of a building. It is easy to hoist and handle into position.

### Reasons for Preference

Architects choose Wunderlich Terra Cotta as a material for the "facing" or enrichment of a building because it offers unfettered opportunities for achieving both the unusual and the distinctive, in modelled form and chromatic effect; and because the results so obtained are assured for all time. Even for outstanding effects by night, this material is found to be pre-eminently the right medium, as the light-reflecting glazed finish possesses particular resplendence when illuminated by flood-light.

### The Cost

As Wunderlich Terra Cotta is specially manufactured for specific positions on a building, the price depends on the extent of the work, amount and repetition of ornamental detail, and the colour effects desired. On receipt of scale plans, elevations and sections, and a clear indication as to the extent and character of the modelling and colour scheme involved, we will furnish an estimate for the manufacture and delivery of the material to the site of the job. Fixing is invariably carried out by the building contractor's workmen.

### Early Co-operation is Desirable

Architects are asked to enlist our early co-operation where our Terra Cotta is involved, as the whole question should be settled before the structural elements of a building are finalised. Also, it is possible that by a slight variation in the design of a building, real savings can be effected ultimately in the manufacture of the Terra Cotta.

### Stock Designs

At our Works at Rosehill (near Sydney) and Sunshine (near Melbourne), we have available a range of models of Paterae, Finials, Columns, Capitals, Bases, Consoles, Ecclesiastical Enrichments, etc., which architects may find adaptable to work in view, thus obviating the cost of preparing special models. On receipt of rough sketches and dimensions, we will forward particulars of any similar architectural ornament or motive for which we possess the model.

### Printed Information

Profusely illustrated Bulletins relating to Wunderlich Terra Cotta will be sent post free to any architect requesting them.

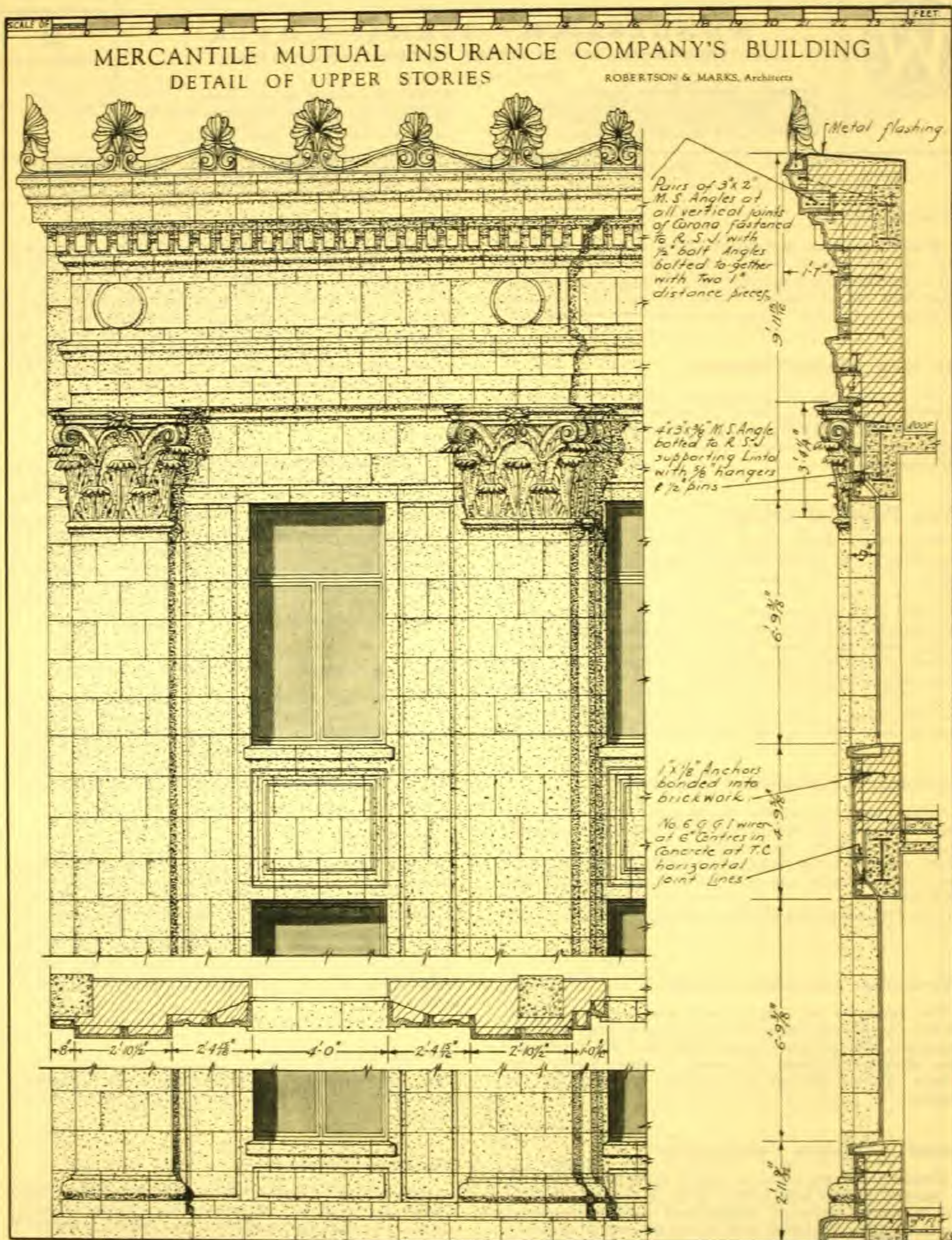
### Contracts Completed

In every capital city of the Commonwealth we have carried out contracts embracing Terra Cotta to entire facades—as well as enrichment to facades largely of another material. A list will be furnished on request.

(Continued on next page)

RAMSAY'S CATALOGUE





TYPICAL FIXING DETAILS — WUNDERLICH TERRA COTTA.



L.T.C.

# THE LIVERPOOL TILE AND TERRA COTTA COMPANY LIMITED

12 CASTLEREAGH STREET,  
SYDNEY

Tel.  
B.W. 1525

Works:  
Atkinson St., Liverpool, N.S.W.

10a

S.A.A. File No.

## General

The Liverpool Tile & Terra Cotta Co. Ltd. are the oldest manufacturers in New South Wales of Terra Cotta Blocks for all structural purposes.

The blocks and tiles manufactured by us are registered as "L.T.C." blocks, and are known by architects and builders under this name, also the structural terra cotta tile floor constructed by us is patented as the "L.T.C. Patent Terra Cotta Tile Floor," thus builders and architects should carefully note that "L.T.C." should be used when specifying terra cotta for all structural purposes when sound, thermal, and fireproof qualities are required in addition to economy.

Any unusual construction features not shown in this catalogue will be promptly provided for by special designs, as our Structural Engineer is always at the complete disposal of architects and builders.

## Products

1. "L.T.C." Structural Terra Cotta Blocks for partitions in all classes of buildings.
2. "L.T.C." Structural Terra Cotta Blocks for lintel construction over windows and doorways in partitions, and for backing up brickwork in external walls.
3. "L.T.C." Structural Terra Cotta Blocks and Tiles as a fireproof casing to beams, girders and columns.
4. "L.T.C." Patent Structural Terra Cotta Tile Floor. "The long span—wide panel floor."

## Terra Cotta Tile

### FIREPROOF

Of all structural materials available to the architect, builder and engineer, terra cotta occupies a most paramount position, and has since the earliest times been used for structural purposes.

It has a variety of uses, and has in recent years been found to be one of the best materials for protecting the steel framework of modern skeleton buildings.

This protection is gained by moulding hollow tiles to suitably cover the exposed steelwork from the ravages of fire. Again, it has been found that when terra cotta hollow tiles are used in conjunction with reinforced concrete for floor and roof construction, one of the greatest advantages of the material is possible; many other materials used with concrete are early disintegrated and are not entirely fireproof, and often corrosive effects occur. As these defects do not occur when terra cotta hollow tiles are used in conjunction with concrete for floors and roofs, it will be readily seen that terra cotta possesses distinct advantages over many materials used at the present time.

The "L.T.C." structural hollow terra cotta tile has been developed to give not only a fireproof material, but is burned and manufactured to give structural strength.



N.S.W. State Savings Bank, where  
"L.T.C." Products have been used

## Terra Cotta Tile

### ADVANTAGES

A few of the points wherein the "L.T.C." structural terra cotta hollow tile excels are:—

- (a) It is composed of clay which has been burned in a kiln at a temperature of 2000 deg. F.
- (b) The quality of the tile may be judged accurately from its appearance.
- (c) It is composed of one of the lightest and strongest materials used for structural purposes.
- (d) The construction with this tile is not only absolutely fireproof, but it is also more nearly soundproof than any solid construction can be.
- (e) The thermal qualities for insulation in roof and other construction are extremely high.

The "L.T.C." partition blocks for floors, roofs, partitions, lintels and fireproofing to steel framework are composed of material of the same qualities, and thus a similar material may be used for all classes of construction.

## The L.T.C. Patent Structural Terra Cotta Tile Floor

### The "Long Span-Wide Panel" Floor

For many years architects and builders have been anxious to secure long spans, with wide panels or bays, and such a condition is now possible with the introduction of the "L.T.C. Patent Floor."

The "L.T.C. Patent Floor" is suitable for all types of loading and for spans up to as long as 28 feet.

Its principal advantages are:—

- (a) All columns, beams, girders and ceilings are completely faced with same material, viz., terra cotta. This ensures the same conditions throughout for surface plastering. No existing type of floor gives this condition, which is so essential from a finished architectural point of view.
- (b) Increased structural safety is obtained by the use of a structural terra cotta tile, between concrete ribs.
- (c) The elimination of centring or formwork for columns, beams, girders, and a 95 per cent. reduction for floor surface.

The only formwork required consists of scaffold planks or a small yoke and soffitt timber for the tile bearing at joints.

The "L.T.C." Patent Structural Terra Cotta Tile Floor is the strongest and the lightest fireproof floor construction for long spans. The function of a long span floor such as this is to dispense with the need of frequent supporting steel beams, thus vastly cheapening the cost of the building and improving the building architecturally.

The "L.T.C." Patent Structural Terra Cotta Tile Floor, by using a special structural

(Continued on next page)



**L - 12" B - 12"**  
W - 28 lbs.  
" - 30 "  
" - 33 "  
" - 36 "

**B - 12"**  
L - 12"  
W - 16 lbs.  
" - 20 "  
" - 22 "

NOTE - LTC PAT. STRUCTURAL T.C. TILES CAN BE OBTAINED (DIM. "L") ALL SIZES TO 12" VARIES

**B - 10"**  
L - 15"

**SIZES D - 7' 8' 9' 10' + SIZES D - 4' 5' 6'**  
LTC PAT. STRUCTURAL TERRA COTTA TILES (FLOOR CONSTRUCTION) + WEB TILE + FLANGE TILE + PARTITION TILE

**FLOOR CONSTRUCTION**

EXTERNAL FACE (BRICK) INTERNAL FACE LTC PARTITION TILE.

LTC WEB TILE LTC SOFFIT TILE STEEL BEAM LTC FLANGE TILE

WALL TIE EVERY 6 COURSES

CONCRETE FLOOR

LTC PARTITION TILE LTC WEB TILES LTC FLANGE TILE LTC SOFFIT TILE

+ LTC PAT. FLANGE & WEB TILES +

HANGER LTC SOFFIT TILE LTC TERRA COTTA TILE + BACKING UP BRICKWORK +

+ LTC PAT. TERRA COTTA TILE + FIREPROOFING FOR + VARIOUS GIRDERS +

**TIME OF FAILURE**

COL TYPE	1	2	3	4	5	6	7	8	9
2 1/2 CONC CASE	[Diagram showing failure time for 2 1/2 inch concrete casing]								
①	[Diagram showing failure time for type 1 column casing]								
②	[Diagram showing failure time for type 2 column casing]								

COMPARISON OF TYPE COLUMN CASING FOR FIREPROOF QUALITY U.S. BUREAU OF STANDARDS TEST

PERSPECTIVE SHOWING CONTINUITY OF MATERIAL

LTC SOFFIT TILE LTC TERRA COTTA TILE LTC WEB TILE LTC FLANGE TILE LTC TERRA COTTA LINTELS LTC PARTITION TILE LTC FIREPROOFING FOR COLUMNS

SPAN	DEPTH "D"	NOS. OF RODS
3' 6" TO 4' 6"	10"	NO. 4 1/2 DIA RODS
4' 6" TO 5' 6"	10"	" 4 1/2 "
5' 6" TO 6' 6"	12"	" 4 1/2 "
6' 6" TO 9' 0"	12"	" 2 1/2 "
9' 0" TO 12' 0"	12"	" 4 1/2 "

LTC TERRA COTTA TILE LINTELS

STANDARD PARTITION TILES - HOLES FILLED WITH CONC FOR ADDITIONAL STRENGTH

**NOTE**

LTC PAT. TILES FOR FIREPROOFING ARE LAID IN MORTAR COMPOSED OF

ONE PART PORTLAND CEMENT  
ONE PART LIME MORTAR  
THREE PARTS SHARP SAND

LTC TERRA COTTA TILE LINTELS SHORT SPANS

SPANS UP TO 3' 0"

4" LTC TILES CEMENT MORTAR

CONCRETE CASING

① LTC PAT. TILES FOR COLUMN FIREPROOFING

②

③ PIPE DUCT

NOTE - TILES ARE TO BE SET TO BREAK JOINTS  
- TILES ARE TO BE SET 1" OFF FACE OF STEELWORK.

**THE L.T.C. PAT. STRUCTURAL TERRACOTTA TILE**  
**TYPICAL FIREPROOF CONSTRUCTION**  
**THE LIVERPOOL TILE & TERRA COTTA**  
**COY. LTD.**  
**12 — CASTLEREAGH STREET — SYDNEY — BW1525.**

**LTC** **LTC**



**L.T.C. Patent Floor—(contd.)**

material, cannot be molecularly damaged by fire in any way whatsoever.

This type of floor has been tested in every possible manner, both in theory and practice, and it has fulfilled every claim made for it.

The first requisite of any floor is that it shall have strength enough to carry the live load expected to be placed upon it, with a factor of safety sufficient to sustain any extraordinary load that may be put upon it—the dead weight should be a minimum, for the less the dead weight, the more economical is the general structure.

The "L.T.C." patent floor gives all this, and it may be used for all types of loading.

It is an excellent non-conductor of sound, being far superior to any solid floor construction or other type using hollow tiles, and it is also excellent as a form of Roof Construction, where coolness is desirable.

In conclusion, it may be stated that the "L.T.C." Patent Structural Terra Cotta Tile Floor, being a product of The Liverpool Tile and Terra Cotta Co. Ltd., may be looked upon as being entirely fireproof, structurally sound, and the most economical type of construction on the market.

**Economising Structural Steel**

The introduction of "L.T.C." patent floor ensures extraordinary structural strength with architectural advantages hitherto unobtainable in Australia.

It is approved by Municipal ordinances, and can be applied to all classes of buildings.

The Liverpool Tile & Terra Cotta Co. Ltd., by placing the "L.T.C." patent floor on the market, are rendering a service demanded by every modern architect and builder.

Used as it is in conjunction with the terra cotta to beams, girders, and casing to columns, a definite advance has been made in the art of structural engineering, for the dead load of a fire proof material is reduced. With concrete casing to beams and columns an uneconomical condition is brought about, as the concrete is not allowed by the municipal authorities to add to the strength of the steel, but an added load occurs, needing heavier steel sections than are required with the "L.T.C." patent floor.

The "L.T.C." patent floor being lighter per sq. ft. than any existing type of floor, a general economy in the whole structure which is most appreciable in large contracts.

**Service to Architects, Builders and Engineers**

The Liverpool Tile & Terra Cotta Co. Ltd., who have patented the "L.T.C." Structural Hollow Tile Floor, supply terra cotta tiles and steel reinforcement complete for the "L.T.C." floor, for any type of construction and loading.

If desired, designs will be carried out by the Structural Engineer to the Company and his staff, free of charge.

No special charge whatever is made for designs, estimates are freely given, and supervision of construction is carried out where the "L.T.C." Patent Structural Terra Cotta Tile Floor is specified.

All terra cotta tiles are delivered to any locality where the construction is being carried out, together with steel reinforcement bundled, labelled and ready for fixing in accordance with the plans prepared by the Company and issued to the architects and builders at no extra cost to either.

We are glad to freely offer this service to architects and contractors as a means of furthering safe and economical methods for the use of our material.

When specifying the "L.T.C." floor, the estimate of cost is made at a definite cost per sq. yd. of floor area, inclusive of the supply of terra cotta tiles for the span and the loading of the panel, also the necessary steel reinforcement.

In addition, the number of cubic yards of concrete per sq. yard of floor area to be supported is given, with number of tiles per sq. yd. of floor area.

Consequently a rapid estimate of total cost can be made by architects and builders.

**List of Representative Work**

Commonwealth Bank Head Office.  
Government Savings Bank Head Office.  
Kembala Buildings.  
Winchcombe, Carson Buildings.  
Underground Liverpool Street Station.  
Underground Wynyard Square Station and Central Station.  
T. & G. Buildings, Druids' House, Hotel Morris, M.U.I.O.O.F. Buildings, Hotel Savoy, Pacific House, Stanton House, Federal Mutual Buildings.

**ARCHITECT'S SPECIFICATION****GENERAL**

All floors, where indicated on drawings, shall be of the L.T.C. Hollow Terra Cotta Tile and Reinforced Concrete Construction, as designed by the Liverpool Tile & Terra Cotta Co. Ltd., who shall supply all L.T.C. Hollow Structural Terra Cotta Tiles and Steel Reinforcement in accordance with detailed drawings furnished and submitted by them for the Architect's approval.

**MATERIALS**

(1) By the L.T.C. Co. Ltd.—

**TERRA COTTA TILES.**—The tiles supplied shall be of the sizes indicated on the detailed drawings and shall be made from well-tempered clay, kiln-burned at a temperature of 2,000 deg. F. No split, warped or cracked tiles shall be allowed. Soffit tiles shall be 1 in. thick; web and flange tiles for steel beams, etc., shall be of such a thickness to provide fire-proofing of ..... in. x ..... in. at the webs and lower flanges respectively.

**REINFORCEMENT.**—The steel reinforcement shall be supplied complete for the reinforcement of concrete floors, slabs and ribs. All reinforcement, including soffit tile hangers, shall be of mild steel and comply with all the conditions and tests of the Australian Standard Specification for Structural Steel.

(2) By the General Contractor—

**Notes.**—Unless otherwise specified, it is understood that the materials and workmanship in the erection of steel-frame flooring or reinforced concrete beams forming floor panels, are part of the General Contractor's work, and should be specified under "Structural Engineer" and "Reinforced Concrete" respectively.

**CONCRETE** shall be of 4:2:1 mix, similar in all respects to that previously specified under "Concrete."

**FORMWORK.**—Formwork for supporting L.T.C. Patent Floor during construction shall be made of sound timbers of sufficient thickness, fixed level and plumb, and securely braced to withstand vibration or movement. No formwork shall be removed until instructions have been issued

by the Architect or by the Liverpool Tile & Terra Cotta Co. Ltd.

**WORKMANSHIP (By General Contractor)**

**TERRA COTTA TILES.**—Allow for placing of L.T.C. Terra Cotta Tiles as shown on detailed drawings. All soffit tiles shall be fixed in position on the soffit of each concrete rib at the same time as tiles are laid; fixing being made by steel hangers properly embedded in concrete. Web and flange tiles to steel beams shall be set in position with full flush and plumb joints broken at courses. A space of ..... in. shall be left between metal and inside of terra cotta, such space being filled with concrete grouted in.

**REINFORCEMENT** shall be accurately bent, securely fastened together and placed in position as shown on drawings with the same care as required in the "Reinforced Concrete" specification.

Rib reinforcement consisting of No. 2 (3) (4) ..... in. reinforcing rods per 6 in. wide concrete rib shall be spaced at 18 in. centres in each panel.

**CONCRETE** shall be placed in position as specified under "Reinforced Concrete."

**Note.**—Concrete should be thoroughly worked around the reinforcement and be lightly tamped so that reinforcement is not shaken or disturbed. Cessations of work, if unavoidable, should be made at the centre of span of ribs or slabs. When re-starting, the surface of hardened concrete should be picked, roughened, washed and slushed with cement mortar before depositing new concrete.

**P.C. SUM**

The General Contractor shall allow a P.C. sum of ..... per sq. yd. of constructional floor area (includes thickness of partitions and walls) for the supply of L.T.C. Hollow Structural Terra Cotta Tiles and Steel Reinforcement for the construction of the L.T.C. Patent Tile Floor. The number of hollow tiles per sq. yd. of floor area is approx. .... cub. yds. The number of cub. yds. per sq. yd. of floor area is approx. ....

(Continued on next page)



STEEL REINFORCING RODS

LTC PAT. WEB TILE

LTC PAT. STRUCT. TC TILE

LTC PAT. FLANGE TILE

R. CONCRETE COLUMN

LTC PAT. STRUCT. TC TILE

LTC SOFFIT TILE

R. C. FRAME

DETAIL OF LTC PAT. FLOOR AT STEEL BEAM SUPPORT

STRUCT. STEEL COL.

STRUCTURAL STEEL FRAME

PANEL SPAN

REINFORCED CONC. COLUMN

DETAIL OF LTC PAT. FLR. AT REIN. CONCRETE SUPPORT

8" LTC PAT. TC TILES

LTC PAT. SOFFIT TILES

SECTION-AA

R.S.J. 8" 4" 18"

R.S.J. 24" 7 1/2" 90"

24" 0"

10" THICK

PANEL LENGTH 20' 0"

R.S.J. 8" 4" 18"

R.S.J. 24" 7 1/2" 90"

LTC PATENT FLOOR

LTC PAT. FLR. SECTION FOR A STEEL FRAMED BUILDING

LTC PAT. WEB TILE

LTC PAT. FLANGE TILE

LTC PAT. TC TILE

LTC PAT. FLR. SECTION FOR R.C. FRAMED BUILDING

LTC SOFFIT TILE

CONCRETE RIB

TOP STEEL R. MENT

LTC SOFFIT TILE

MAIN R. MENT

SECTION OF RIB

LTC TC TILE

TOP STEEL R. MENT

LTC SOFFIT TILE

SECTION THRO LTC PATENT TC TILE

LTC PATENT FLOOR SUPPORTED ON WALLS

SPAN

LTC PAT. TILES - SIZES & WEIGHTS

SPAN	4" 16 lbs	5" 20 lbs	6" 22 lbs	7" 28 lbs	8" 30 lbs	9" 33 lbs	10" 36 lbs
8' 0"	OFFICE						
10' 0"							
12' 0"							
14' 0"		OFFICE					
16' 0"			OFFICE				
18' 0"				OFFICE			
20' 0"					OFFICE		
22' 0"						OFFICE	
24' 0"							OFFICE

SHAPE

A = 1 1/8"

A = 1 1/8"

A = 1 1/8"

FOR HEAVY LOADS BLOCKS ARE MADE AS PER DESIGN TO CARRY LOADS SPECIFIED

STEEL REINFORCEMENT

R.S.J. 16" 6" 60"

SECTION-AA

20' 0"

6" THICK

6" THICK

6" THICK

24' 0"

SOLID SLAB FLOOR

COMPARISON OF LTC PATENT FLR. FLOOR & SOLID SLAB OFFICE & PARTITION LOADING

THE LTC PAT. STRUCTURAL TERRACOTTA TILE FLR.

THE "LONG SPAN-WIDE PANEL" FLOOR

FOR ALL TYPES OF LOADING. PATENT No 25862.

THE LIVERPOOL TILE & TERRA COTTA COY. LTD.

12 CASTLEREAGH STREET, SYDNEY, BW1525.

**LTC**

**LTC**

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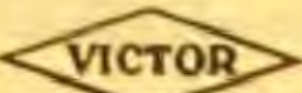
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 <p><b>VICTOR</b> AND WARATAH HIGH-GRADE PLASTER AND VICTOR- GYPSUM PRODUCTS</p>	<p>Cable and Telegraphic Address: "Plaster" Melbourne; "Plasco" Sydney; "Plaster" Brisbane.</p>		<p><b>10a</b></p> <p>S.A.A. File No.</p>
	<p><b>AUSTRALIAN GYPSUM PRODUCTS PTY. LTD.</b> AGENTS AND SUPPLIERS FOR VICTOR ELECTRIC PLASTER MILLS PTY. LTD., AUSTRALIAN GYPSUM LTD., AND PENINSULA PLASTER CO. PTY. LTD. MELBOURNE — SYDNEY — BRISBANE</p>		
	<p>Head Office: LORIMER STREET, SOUTH WHARF, SOUTH MELBOURNE, S.C.5. Phones: M 2431, M 3602.</p>		
	<p>Sydney Office: No. 15 Wharf, Pyrmont, N.S.W. Phone: MW 1067. Brisbane Office: Bowen Street, Brisbane, Queensland. Phone: B 3806. And at Newcastle and New Zealand.</p>		

[For Other Products, See Page 178]

## VICTOR-GYPSUM PARTITION BLOCKS

Registered No. 7759.

Victor-Gypsum Partition Blocks have an established reputation in the building world through repeated use by Architects, Contractors and Builders. They are fire resisting, also heat, cold and sound

resisting. Light in weight, strong and tough, and erect economically and without waste. Victor-Gypsum is a recognised material for interior, non-bearing partitions, wall-furring, etc.

### Fire Resistance

The superior qualities of gypsum as a fire-resisting building material for use throughout all classes of buildings have been definitely established by numerous tests carried out by such noted institutions as the Underwriters' Laboratories Inc. The U.S. Bureau of Standards, the British Fire Prevention Committee, and the National Board of Fire Underwriters, etc.

When submitted to fire, the temperature of gypsum blocks, except on the surface directly exposed to the flames, can never exceed 212 degrees Fahr.

In recent building codes gypsum is rated as the equal of cement concrete as a fireproofing material. At an official fire test carried out at the Metropolitan Fire Brigade Headquarters Station, the remarkable fire-resisting qualities of Victor-Gypsum were fully demonstrated in the presence of representatives of Fire Underwriters, Town Hall Authorities, Public Works Department, and Fire Prevention Officials, the Royal Victorian Institute of Architects, also Engineers and Builders from various States of the Commonwealth.

Throughout the progress of the fire, Official readings of the pyrometer were taken to comply with the necessary requirements of the Fire Underwriters Association and the City Council Building Authorities' approval.

Over 2000 deg. Fahr. interior heat pressure was reached, while radiation or exterior heat of structure did not exceed 100 deg. Fahr.

Examination disclosed, after the fire had been extinguished by applying the water over the structure both inside and out, and from the enormous heat pressure obtained, practically no effect apart from small interior surface fractures.

The above facts are of great importance to Architects, Engineers and Builders, as illustrating the remarkable fire resistance of Victor-Gypsum, which, combined with the lightness, demonstrates its suitability for use throughout the interior of buildings.

### Insulation

Gypsum, with its close-knit air confining cells, has the highest insulating value of any fire-resisting cementitious structural building material.

It thus combines insulation and strength in one homogeneous substance. Present-day efficiency demands a non-combustible material which conserves heat in winter and maintains cool working conditions even in the hottest summer weather. Victor-Gypsum meets this demand at a minimum cost.



### Lightweight

Gypsum is the lightest of the structural building materials, having approximately 40 per cent. of the weight of concrete.

Where used structurally in floor and partition blocks, the light weight of gypsum, combined with strength, reflects decided economies in all supporting members, including savings which frequently amount to large sums when freight or railage, haulage, hoisting and erection, also interest on the investment is carefully considered.

### Non-Conductor of Sound

Victor-Gypsum Partition Blocks are excellent non-conductors of sound, and are recommended for use in hotels, office buildings, schools, apartment houses and all buildings where soundproof partitions are of importance. Authentic tests show that less than one hundredth of one per cent. of incident sound is transmitted through a gypsum block partition plastered with gypsum plaster.

### Ease of Erection

Because of their light weight (approximately 25 to 50 per cent. lighter per square foot than ordinary building tiles of equal thickness) yet comparatively large size, Victor-Gypsum blocks permit easier and faster erection. They can be easily sawn to fit around openings, pipes, etc., and small pieces left over from hand sawing may be bonded into the partition walls. Chases for conduits, pipe lines, etc., can also be readily made.

### Plaster Saving

Victor-Gypsum Blocks are produced with straight edges and uniformly corrugated surfaces without any distorted or warped faces, and when set in a wall they will present a surface requiring less plaster than other forms of partition walls. As there are less joints in a Victor-Gypsum partition wall, this also results in a considerable saving in setting mortar.

### Weights and Thicknesses of Victor-Gypsum 30 x 12in. Partition Blocks

Thickness, inches.	For Ceiling Heights up to feet.	Wt. Block per sq. ft. lbs.	Wt. Mortar per sq. ft. lbs.	Weight Plaster, one side per sq. ft., lb., 1/2 in. grounds.	Weight Plaster, two sides per sq. ft., lb., 1/2 in. grounds.
3 hollow	13	9.9	2	3	6
4 "	17	13	2.5	3	6
6 "	30	16.6	3	3	6
8 "	40	22.4	4	3	6
2 solid	10	9	1.5	3	—

(Continued on next page)



**Laying**

It is recommended that Victor Sanded Plaster or Victor Unfibred Cement Plaster be used in laying Victor-Gypsum Partition Blocks. Victor Sanded Plaster, having a base of gypsum plaster to which is already added clean, sharp sand, proportionately mixed, and requiring only the addition of water, makes a perfect bond, and ensures speed, and economy in the elimination of time and labour spent in mixing other mortars on the job.

**REPRESENTATIVE WORK**

**Victoria**—Howey Court, Collins St., Melbourne, C.I. Architect: Marcus R. Barlow. G. J. Coles Stores, Bourke St., Melbourne. Architect: Harry A. Norris. Vaughan Buildings, Melbourne. Architects: Gawler & Drummond. Lucullus Limited, Collins St., Melbourne. Architects: Blackett & Forster. Taxation Department, Lonsdale St., Melbourne, C.I. Architects: Oakley & Parkes. Ivanhoe Grammar School, Victoria. Architects: Phillip B. Hudson, Wardrop & Ussher. Notting Hall, Auburn, Victoria. Architect: A. K. Lines. Epworth Hospital, Richmond, Victoria. Architect: Alec. S. Eggleston. Commercial Bank Building, Melbourne. Architects: Carleton & Carleton. Hotel Warrnambool. Architects: Thompson & Terry. Public Works Offices, Melbourne. State Electricity Commission, Melbourne.

**Adelaide**—Harris, Scarfe Ltd. Architects: E. H. McMichael & Harris. Shell Company (Offices). Hotel Ambassadors. Norwich Union Assurance Co. (Office Block). Architects: Milne, Evans and Russell. "News" Limited. Architect: C. W. Rutt. St. Joseph's, Providence. Architect: L. Hodgson. Barr Smith Library. Architects: Woods, Bagot, Jory & Laybourne Smith.



Constructing Partition Walls with 3-inch Victor-Gypsum Blocks—Fire Resisting, Light Weight and Sound Deadening. No waste, as all sawn sections may be bonded in.

**New South Wales**—Commonwealth Bank, Lismore. Government Architect.

**Queensland**—A.M.P. Buildings, Brisbane. Architects: Hall & Cook. Colonial Mutual Offices. Architects: Hennessy & Hennessy.

**ARCHITECT'S SPECIFICATION FOR VICTOR GYPSUM PARTITION BLOCKS****(A) MATERIALS.****(1) PARTITION BLOCKS.**

All non-bearing partitions, furring, vent shafts and other special partition work noted in the specifications shall be erected with Victor-Gypsum Partition Blocks as manufactured by Australian Gypsum Products Pty. Ltd. Blocks shall be of the thickness and type indicated on drawings (or as set out in the Schedule of Partition Work).

**(2) MORTAR.**

Victor-Gypsum Partition Blocks shall be laid with mortar consisting of (a) Victor Sanded Plaster, or (b) one part of unfibred Victor Cement Plaster to three parts of clean, sharp sand, by weight, thoroughly mixed with fresh water. Do not mix more than can be easily applied in an hour.

Note.—Do not use Portland Cement or Lime Mortar.

**(3) ANCHORS AND TIES.**

Note.—This paragraph to be included in "Concretor" or "Bricklayer."

Metal anchors used for anchoring Victor-Gypsum Partition Blocks to brick (or concrete) walls shall be an approved type, and shall be accurately built into walls as follows:—(1) Anchors for furring partitions shall be spaced one for each square yard. (2) Anchors for tying ends of partitions to walls shall be spaced 12 in. apart on centres, ready for building in to the courses of Gypsum blocks when erected.

**(4) REINFORCING RODS.**

Note.—Include this paragraph in "Structural Steel."

Reinforcement of Victor-Gypsum Partition Block lintels spanning openings 4 to 6 ft. wide shall consist of No. 4  $\frac{3}{8}$ -in. mild steel bars to each lintel. Bars shall be at least 12 in. longer than actual width of opening.

**(B) WORKMANSHIP.****(5) ERECTION.**

All Victor-Gypsum Partition Blocks shall be laid with the mortar previously specified. Partitions shall start at the floor with a mortar bed, and shall be laid plumb and true with full flush joints, with horizontal beds consistently level at each course. Vertical joints shall be broken and the partitions shall be wedged at the ceilings and flushed with mortar. Corners and intersections shall be built by interlocking the blocks of alternate courses.

**(6) FURRING, ETC.**

Furring, where indicated on drawings, shall be securely anchored to brick or concrete walls every square yard with metal ties or straps left in place by the "Bricklayer" or "Concretor." The ends of partitions abutting brick or concrete walls shall be similarly secured, the anchors being spaced one to each course of Victor-Gypsum Partition Blocks.

**(7) LINTELS.**

Openings in partition walls shall be spanned as follows:

(i) Openings 22 in. wide or less shall be spanned with a single Victor-Gypsum Block, having a bearing of not less than 4 in. at each end.

(ii) Openings between 22 in. and 48 in. wide shall be spanned with Victor-Gypsum Blocks sawn to form centre key blocks and skew-backs at each bearing laid in the form of a flat arch with a bearing of at least 6 in. at each end.

(iii) Openings over 4 feet, but not greater than 6 feet, shall be spanned with Victor-Gypsum Blocks solidly filled with Victor Sanded Plaster or Victor Cement Plaster and reinforced with steel bars as described in "Structural Steel." Bearings at each end shall not be less than 6 in.

(iv)—An alternative for ii and iii.—Openings shall be spanned with approved pre-cast lintels, having a width of the full thickness of the partition and a depth of 1 ft., and a bearing of at least 6 in. at each end.

Note.—For spans greater than 6 ft., specify under "Structural Steel," metal lintels of an approved type, having a 9 in. bearing at each end.

**(8) ROUGH WOOD FRAMES.**

Note.—This and the following paragraph are to be included in "Carpenter."

Frame and erect rough wood frames for door openings in Victor-Gypsum Partition walls in advance of those erecting partitions. The frames shall be 2 in. thick and have a depth equal to the thickness of the block, and shall have  $\frac{3}{4}$  x  $\frac{1}{2}$  in. grounds nailed to both sides of frame to door height in order to form a pocket to receive ends of partition blocks. Secure approved metal ties to frames, ready for building in to partitions when erected.

Note that the above-mentioned grounds may also form the fixing for finished wood architraves.

**(9) NAILING STRIPS FOR JOINERY GROUNDS.**

(i) Nailing strips of  $\frac{1}{2}$  in. thickness and of such other dimensions to cover the end of block shall be nailed to end of each Victor-Gypsum Block to form fixing for all wood grounds to receive skirtings, picture rails, etc.; or

(ii) 2 in. x  $\frac{1}{2}$  in. sections of oregon shall be inserted in the Victor-Gypsum Block cores at the desired positions to provide fixing for joinery grounds.

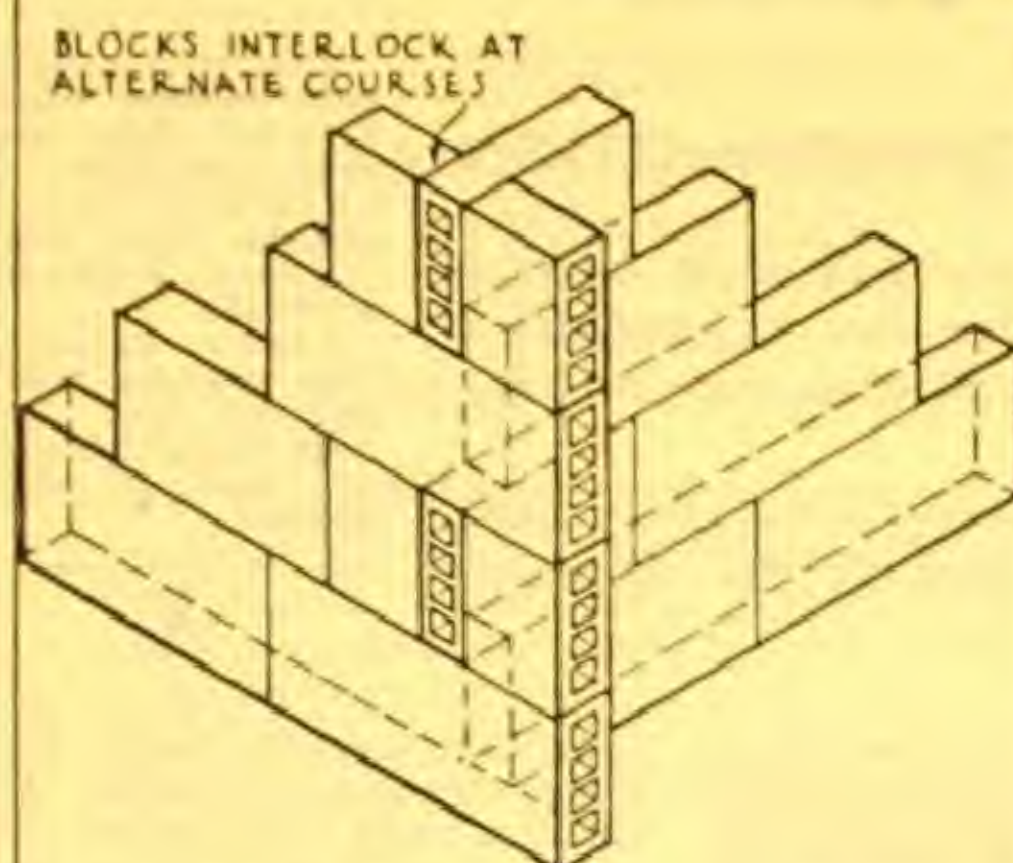
Note.—Lavatory basin brackets and other supports for heavy fixtures are best secured to partitions by bolting through blocks, as shown on detailed drawing.

**(10) PLASTERING.**

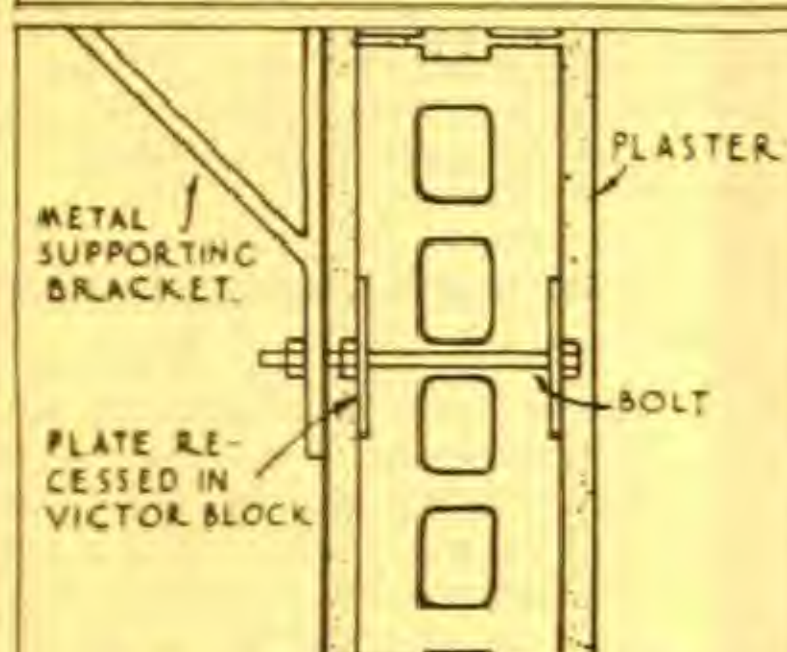
Note.—Plastering on Victor-Gypsum Partition Blocks shall be carried out in accordance with the recommended specifications given on page 179.

(Continued on next page)

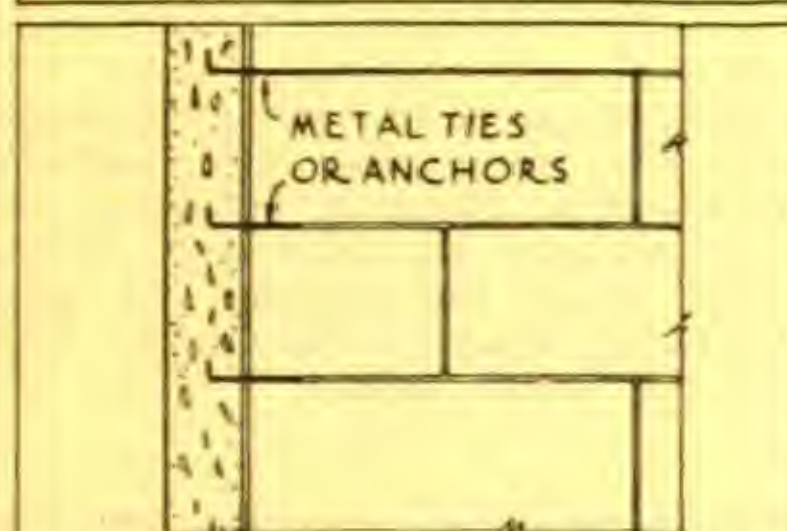




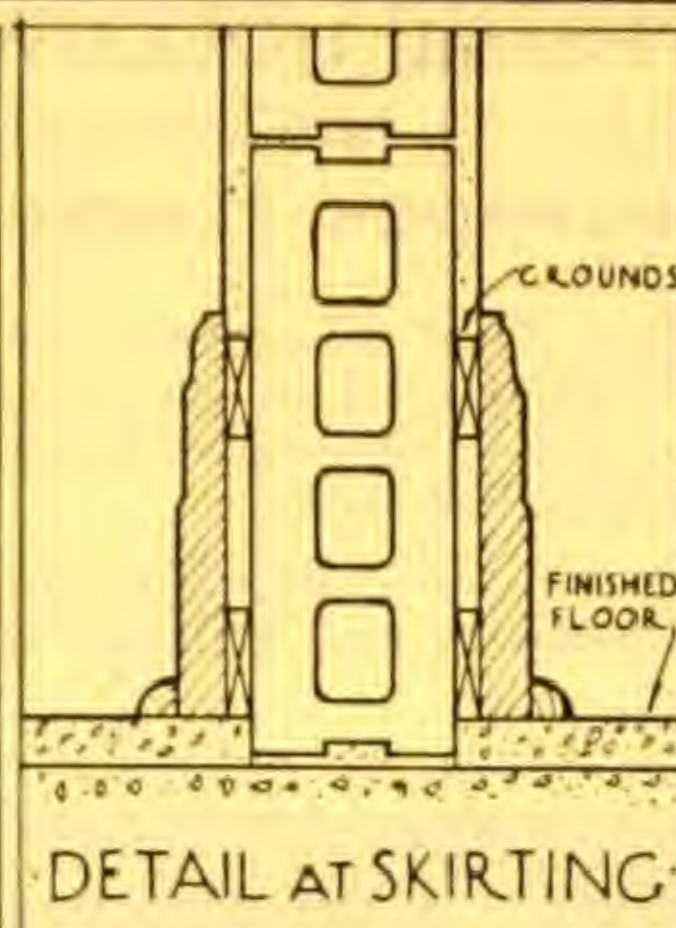
DETAIL AT WALL INTERSECTION



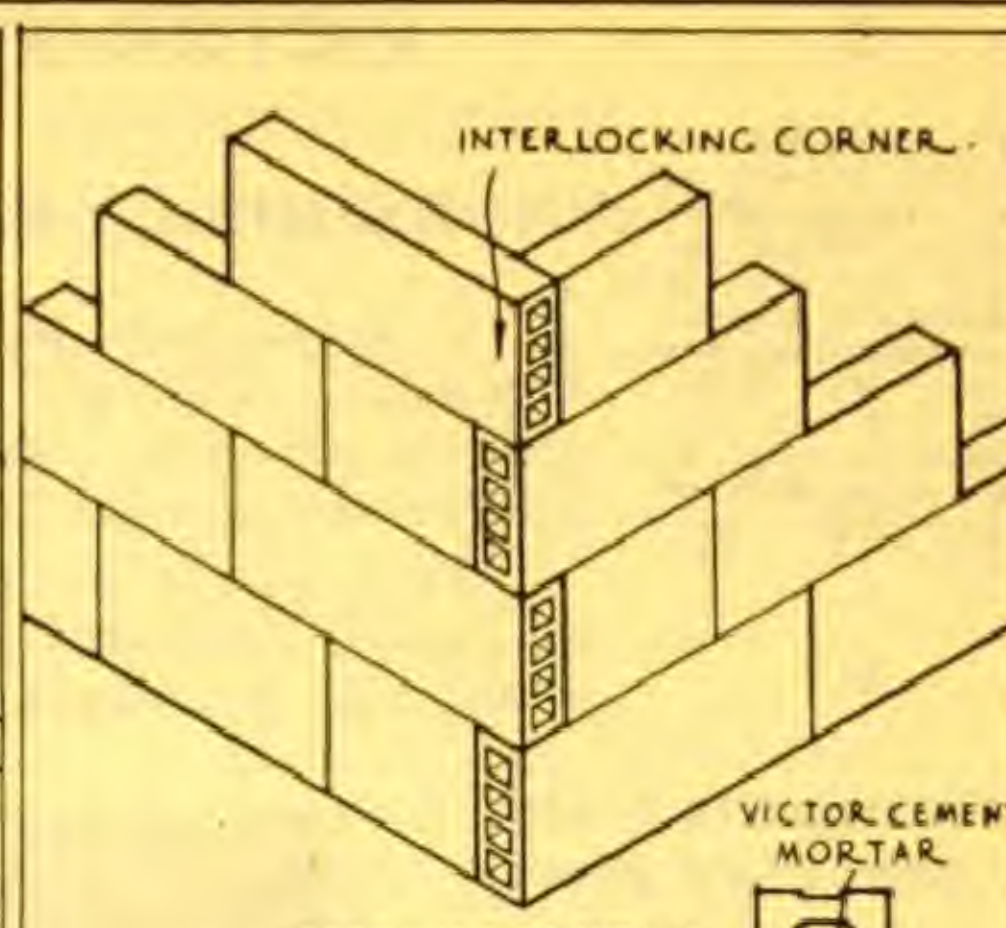
METHOD OF SUPPORTING HEAVY FIXTURES



METHOD OF ANCHORING TO CONCRETE WALLS.

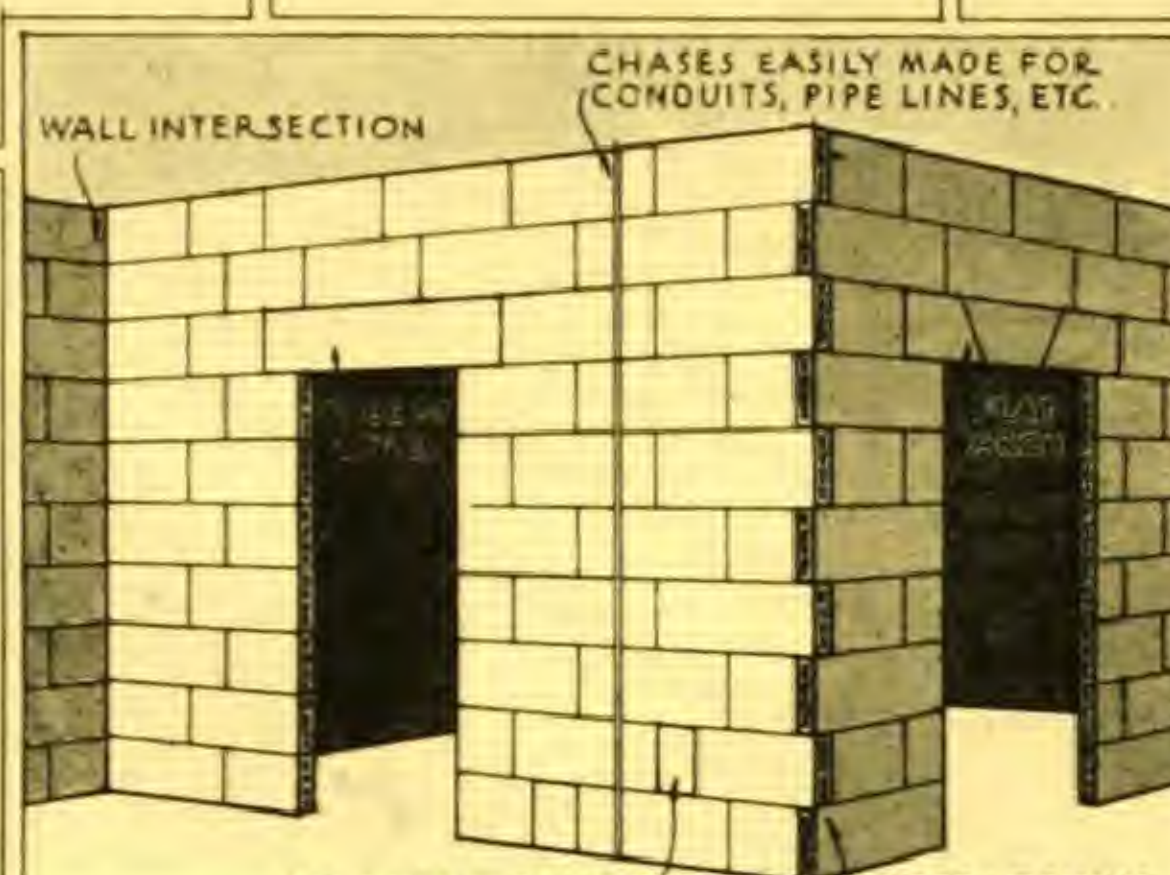


DETAIL AT SKIRTING

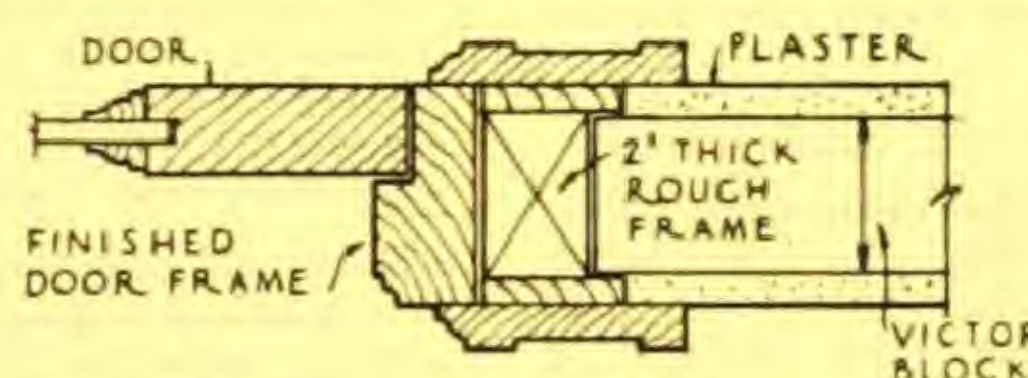


CORNER DETAIL

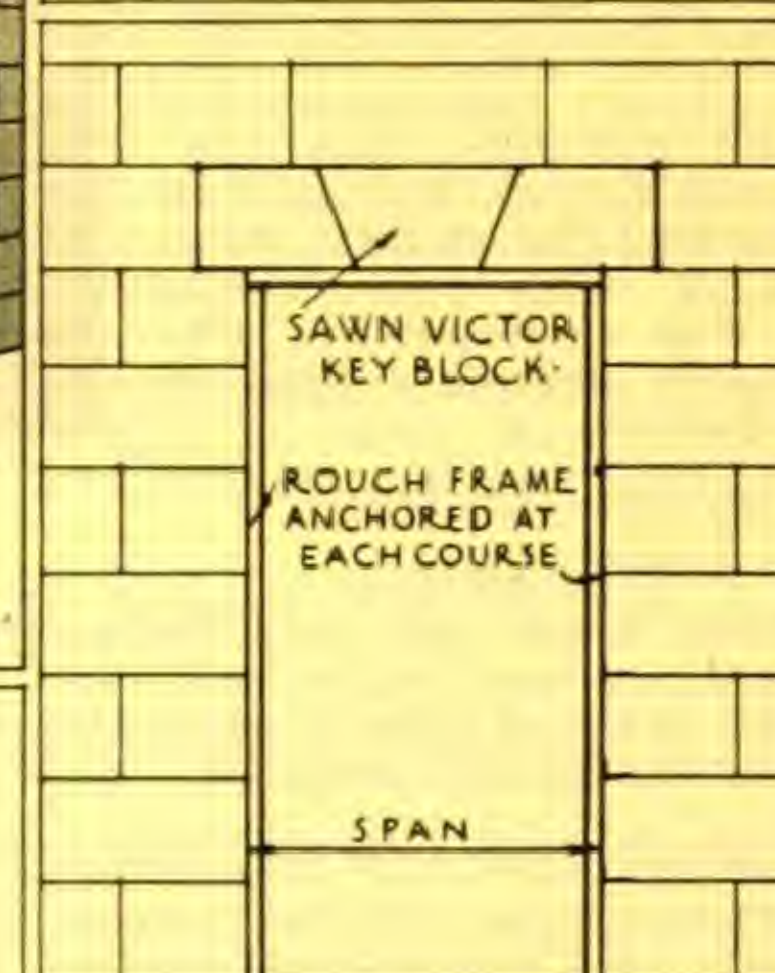
REINFORCEMENT OF VICTOR BLOCK LINTEL FOR SPANS OF 4 FT. TO 6 FT.



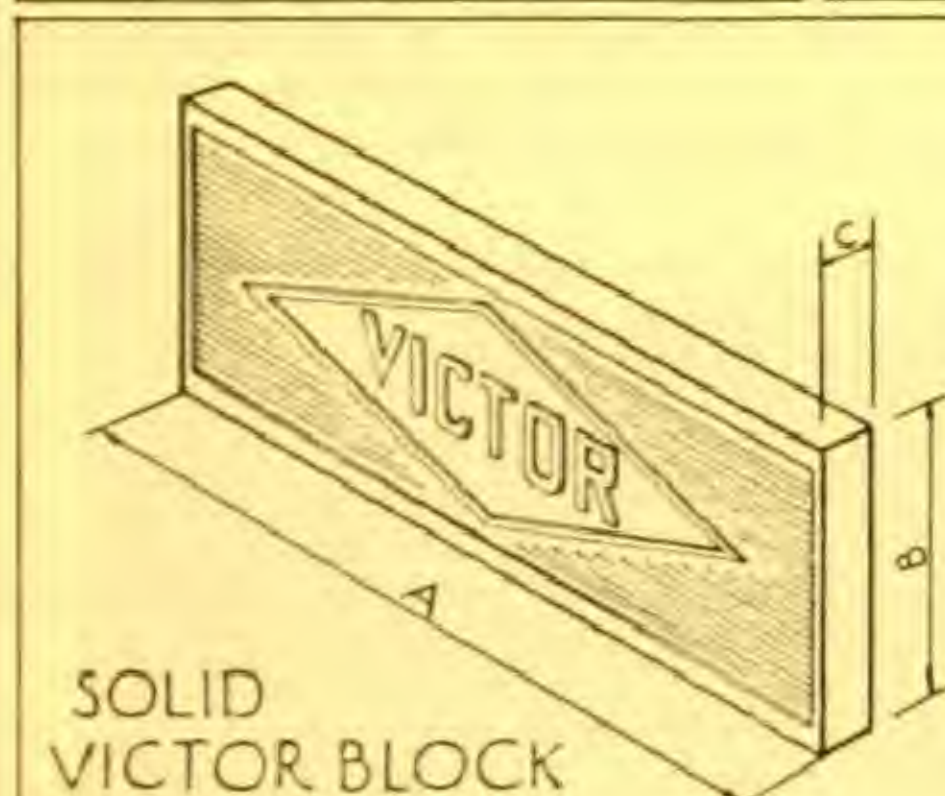
PERSPECTIVE OF GENERAL APPLICATION OF VICTOR BLOCKS



TYPICAL JAMB DETAIL



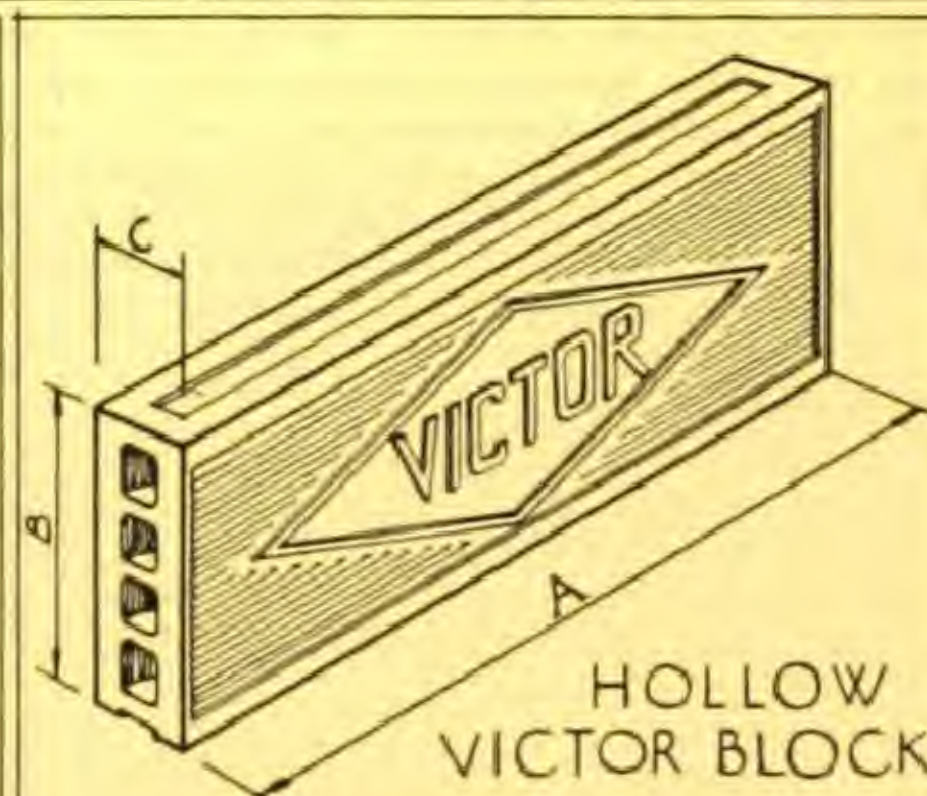
STANDARD FLAT ARCH FOR SPANS OF 22 TO 48 INS.



SIZES AND WEIGHTS OF STANDARD BLOCKS

TYPE	A	B	C	WT. PER SQ. FT.
HOLLOW BLOCK	2'-6"	1'-0"	3"	9.9 LBS
	"	"	4"	13
	"	"	6"	16.6
	"	"	8"	22.4
SOLID	2'-6"	1'-0"	2"	9

IF DESIRED, SOLID BLOCKS IN ANY OF THE ABOVE SIZES CAN BE SUPPLIED.



## DETAILS OF THE ERECTION OF VICTOR-GYPSUM PARTITION BLOCKS.

DRAWING NO. 1  
8TH MAY 1931



## VICTOR-GYPSUM HOLLOW BLOCKS FOR

### "INNES-BELL" FIREPROOF FLOOR CONSTRUCTION

The method of building known as the "Innes-Bell" System, which includes the use of tapered end blocks, is protected by the Patent No. 12151/1923, and any unauthorised use of the system will be rigorously contested.

Victor-Gypsum Hollow Floor Blocks are the best and most modern obtainable. They are manufactured in one piece for use in connection with the patented "Innes-Bell" Two-way Flat Slab System, the One-way Rib System, also the Square Slab System.

These Blocks and Systems of construction are being extensively used by leading Architects, Engineers and Builders throughout the Commonwealth and New Zealand.

The Victor-Gypsum Hollow Floor Block has also been patented in respect of all shapes and sizes (Letters Patent 11170/28).

Legal proceedings will be taken against any unauthorised maker or user of such Blocks.

#### Advantages of Victor-Gypsum Floor Blocks

##### 1. FIRE RESISTANCE.

The superior qualities of Gypsum as a building material possessing remarkable fire-proofing properties have been definitely established by numerous tests carried out by such institutions as the Underwriters' Laboratories Inc., the U.S. Bureau of Standards, the British Fire Prevention Committee, etc. Local tests have been conducted by the Metropolitan Fire Brigades Board in compliance with requirements of Fire Underwriters, City Council and other building authorities.

##### 2. SOUND AND HEAT INSULATION.

Both sound and heat insulating properties are possessed to a large degree by Victor-Gypsum Hollow Blocks. Floor and roof slabs in which they are incorporated have exceptionally high insulating values.

##### 3. STRENGTH AND FREEDOM FROM BREAKAGE.

Victor-Gypsum Hollow Blocks, being thoroughly reinforced, are strong and tough. They are not easily damaged during handling or building operations, and this freedom from breakage assures true seating of blocks on the jobs, together with even soffits.

##### 4. LIGHT WEIGHT.

Victor-Gypsum Hollow Blocks are extremely light, being in some instances more than a third lighter than blocks of similar dimensions in other materials. Handling and placing costs are thus practically halved, and a very appreciable saving in dead weight on floors, columns and footings is effected (approx. 10 lbs. per sq. foot of floor area in the average office type building).

##### 5. CLOSED ENDS.

Victor-Gypsum Hollow Blocks are totally enclosed one-piece blocks, ensuring perfect joints where butted together, and obviating the necessity for special blocks to terminate the rows. The introduction of Cross Ribs, so desirable in one-way rib-construction, is also facilitated.

Open-ended floor blocks frequently leave gaping joints in soffits of slabs which the plasterer has difficulty in making good, and, by reason of their rough ends and imperfect joints, permit considerable loss of concrete into the interior of the blocks. This results in an increase in dead load to an unknown extent and an increase in building costs of an amount which cannot be predetermined.



Placing Victor-Gypsum Hollow Blocks.

By the use of these one-piece closed-end blocks, Architects and Engineers are assured of having a perfect hollow-block floor and the Builder is guaranteed against loss of concrete. The numerous advantages gained by the use of Victor-Gypsum One-piece Blocks are immediately evident.

##### 6. WIDE RANGE OF SIZES

Victor-Gypsum Hollow Blocks are available in any height from 4 in. to 14 in. The widths and lengths may be varied from the customary 24 in. x 24 in. two-way or the 30 in. x 18 in., and 30 in. x 24 in. wide one-way blocks, this latter size being strongly recommended for economy.

Tapered Blocks (see Fig. B, page 64) are procurable to provide increased concrete area near rib supports for resisting shear and negative bending stresses, and stirrups are frequently eliminated by their use. When used in conjunction with steel construction or with concrete beams not requiring flanges, the blocks may be extended right up to the beam sides.

##### 7. UNIFORM SHAPES.

Accurate uniform shapes and an absolute freedom from warping are ensured by the method of manufacture. True clean soffits and an excellent key for plastering are provided.

These one-piece Hollow Blocks can be readily and cleanly sawn—a great convenience in placing conduits, junction boxes, etc., for wiring purposes, permitting them to be easily flushed into ceiling.

##### 8. SAVINGS.

Considerable savings are effected by the use of Victor-Gypsum Hollow Floor Blocks in—

- (a) Railage or freight.
- (b) Handling and hoisting.
- (c) Freedom from breakage.
- (d) Guarantee from loss of concrete.
- (e) Economy of plastering materials.
- (f) Floor, column, and footing construction owing to lightness of blocks.

#### SERVICE

Information and all data will be gladly supplied to Architects, Engineers, Builders, and others interested in the use of Victor-Gypsum Hollow Blocks and the Innes-Bell Systems of Floor Construction, on communicating with Australian Gypsum Products Pty. Ltd., at their Head Office, Lorimer Street, South Wharf, South Melbourne, S.C.5. (Phones M.2431, M.3602), or any of their Interstate or N.Z. Offices.

(Continued on next page)



## VICTOR-GYPSUM HOLLOW BLOCKS

FOR

## "INNES-BELL" FIREPROOF FLOOR CONSTRUCTION

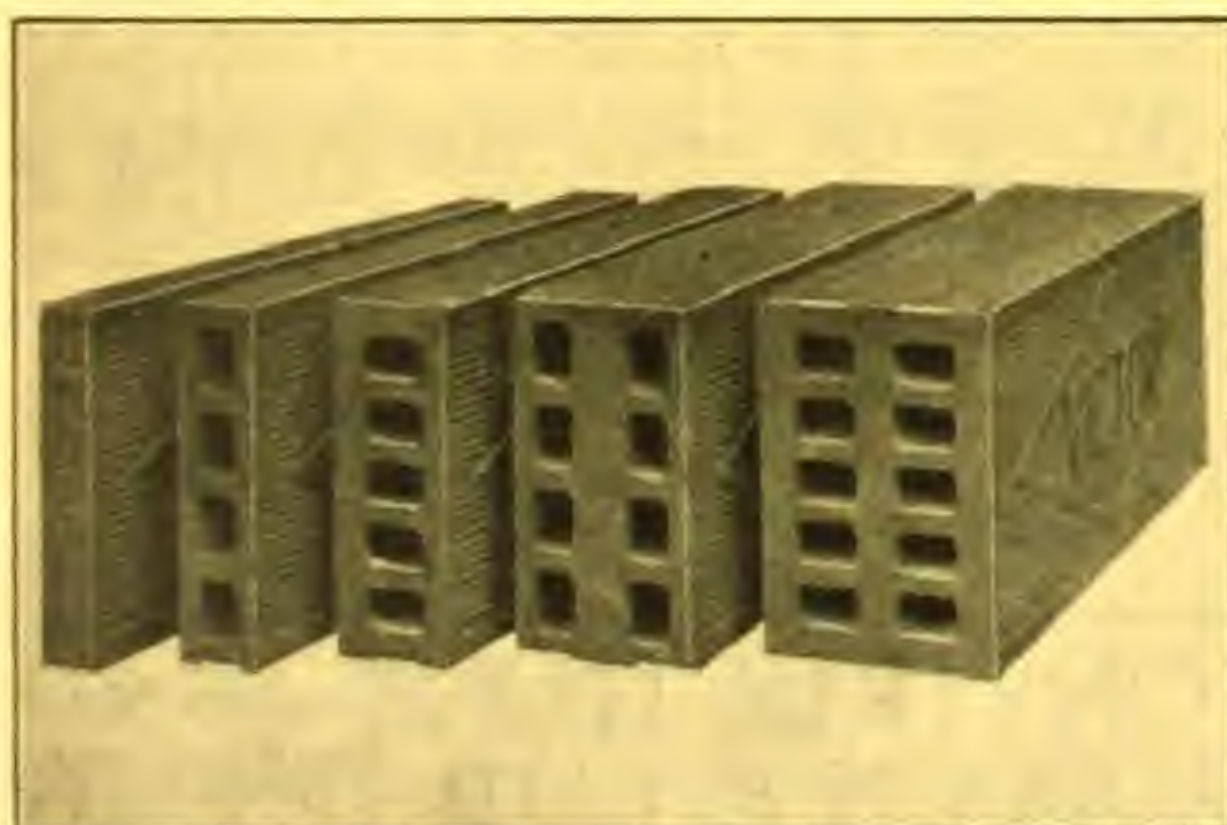
## "Innes-Bell" Two-Way Flat Slab System

(Patent No. 12,151)

(See Fig. A—Page 66)

## Advantages.

1. LONG SPANS of up to 40 feet obtainable at minimum cost.
2. RAPID CONSTRUCTION is a feature of this system.
3. CLEAN, SMOOTH CEILINGS, unbroken by projecting beams, ensure ideal distribution of light and perfect ventilation. No dead-air pockets exist.
4. STRENGTH AND RIGIDITY. The network of ribs in two directions renders this system ideal for supporting heavy concentrated loads. Resistance to deflection is much greater than that of ordinary flat slab floors.
5. INSULATION against sound and heat is ensured by the use of Victor-Gypsum Hollow Blocks.
6. FORMWORK is greatly simplified and reduced in cost, as a flat decking only is required; timber after stripping has a high salvage value, there being no wastage from cutting to short lengths. The open system of timbering may be employed if preferred.
7. STRIPPING COSTS are minimised, as sheeting drops away from ceiling upon removal of tomming, and is ready for re-use.
8. REINFORCING STEEL is considerably reduced in quantity and simplified. Long rods and stirrups are usually eliminated and cranking of rods is avoided. The arrangement of steel in ribs simplifies supervision, the omission of any rod being instantly detected.
9. COLUMN CAPITALS may be omitted if desired for lightly-loaded floors of moderate span, e.g., in office or domestic type buildings.
10. HEADROOM is unobstructed by beams, hence storey heights may frequently be reduced.
11. MECHANICAL EQUIPMENT, overhead runways, shafting, piping, etc., are attached more easily and simplified owing to the absence of beams, and the number of sprinkler heads is reduced.
12. STRUCTURAL STEEL COLUMNS may be used in conjunction with these floors, simple, inexpensive brackets only being required.
13. OPENINGS in floors may be trimmed effectively by omitting hollow blocks where necessary to form beams contained within the depth of floor.
14. SAVINGS are effected in Concrete, Steel, Formwork, Stripping and Plastering Costs, and there is A GREAT REDUCTION IN TIME OF CONSTRUCTION.



Victor-Gypsum Partition Blocks. Standard size, 30 in. long by 12 in. deep, by either 2 in., 3 in., 4 in., 6 in., or 8 in. in thickness.

## "Innes-Bell" One-way Rib System

(See Fig. B—Page 66)

## Advantages Over Ordinary Beam and Girder Construction.

1. SECONDARY BEAMS are ELIMINATED, ceilings being unbroken except by main beams. Better lighting and ventilation is effected and subdivision by partitions is simplified. Costs of plastering and of sprinkler systems, etc., are reduced.
2. INSULATION against sound and heat is improved by the use of Victor-Gypsum Hollow Blocks.
3. FORMWORK and STRIPPING COSTS are reduced. The open system of timbering is recommended, one plank under each rib being sufficient.
4. REINFORCING STEEL is simplified and reduced in amount.
5. CROSS RIBS (see Fig. B, page 64) are easily formed without special blocks, owing to the closed ends of the one-piece Victor-Gypsum Hollow Blocks; such Cross Ribs, in addition to increasing the rigidity of the floor, serve to distribute any concentrated load to the adjacent ribs. The comparatively shallow slab of beam and girder construction is not nearly so well adapted for carrying unforeseen concentrated loads as is the One-Way Rib System incorporating Cross Ribs.
6. STRONG ROOMS and other heavy concentrations of loading may be provided for by the omission of a row of Hollow Blocks, thus, with suitable reinforcement forming a wide beam within the depth of the floor.

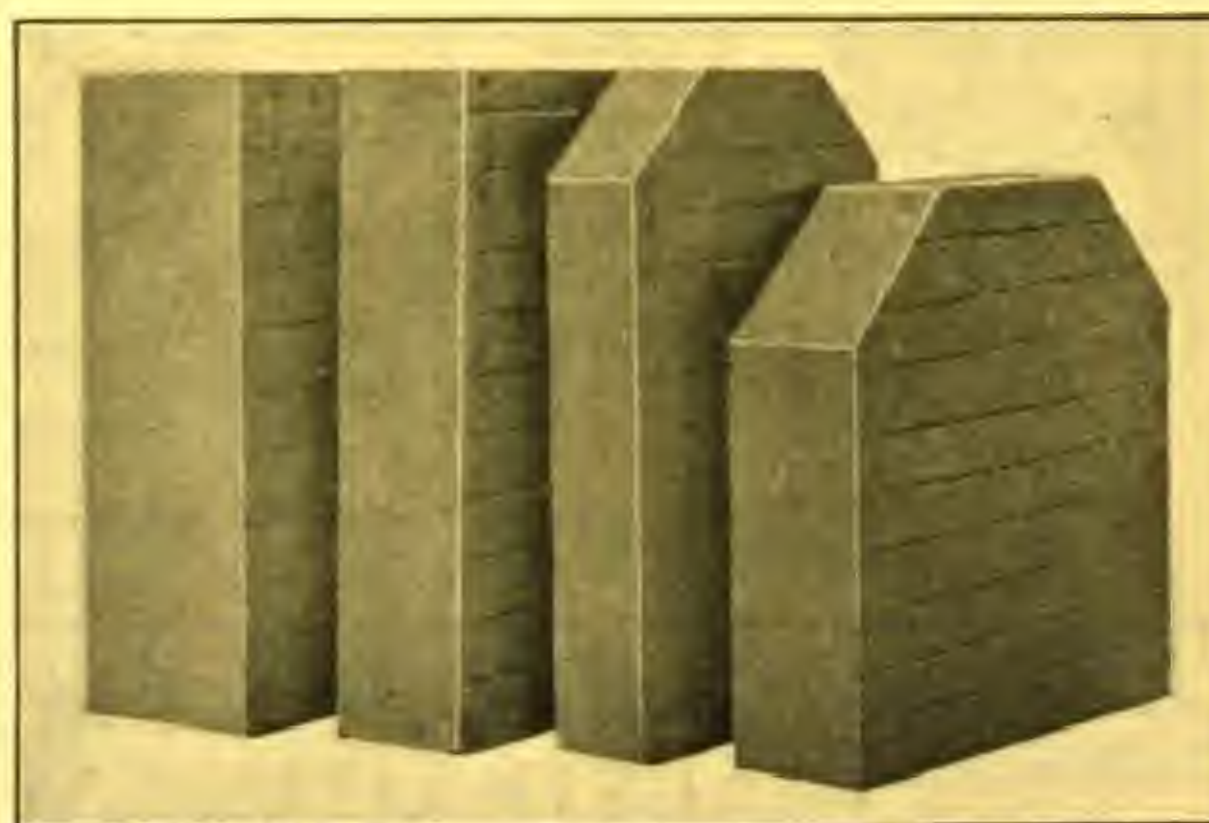
The One-Way Rib System, while providing the above advantages, generally costs no more than beam and girder construction, and frequently considerable savings are effected.

## "Innes-Bell" Square Slab System

(See Fig. C—Page 66)

This system is distinctly economical, possessing all the advantages accruing from the use of One-piece Victor-Gypsum Hollow Blocks. Owing to the economical properties of the slab supported on four sides and the use of the Hollow Blocks, very large spans are possible at minimum cost. The supporting beams, being on column centres in two directions, are not excessive in section.

Where for architectural reasons beam effects are desired, as in the case of ceilings over banking chambers, insurance offices, etc., this system may be used to advantage. The bays, for economy, should be square, or nearly so.



Illustrating One-piece Victor-Gypsum Hollow Floor Blocks. Note the Tapered Blocks. For range of sizes and particulars, see page 64.

(Continued on next page)

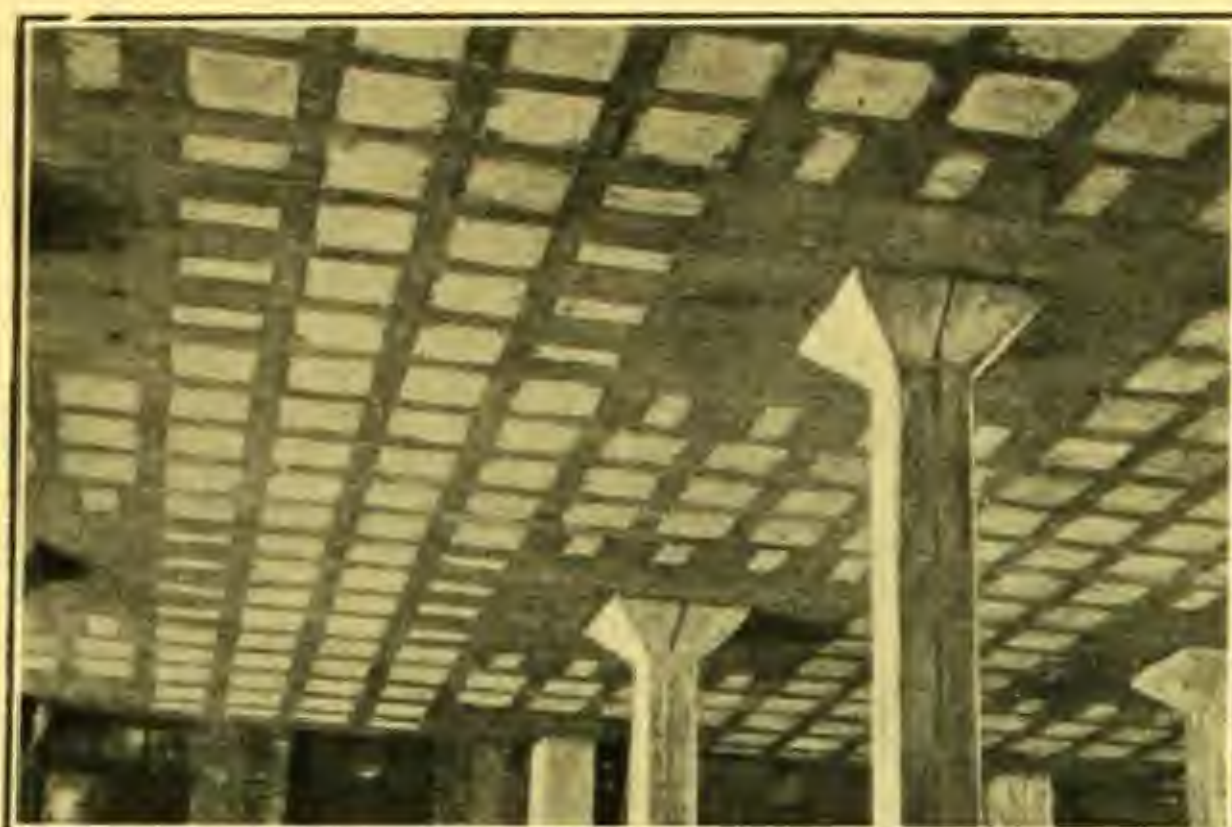
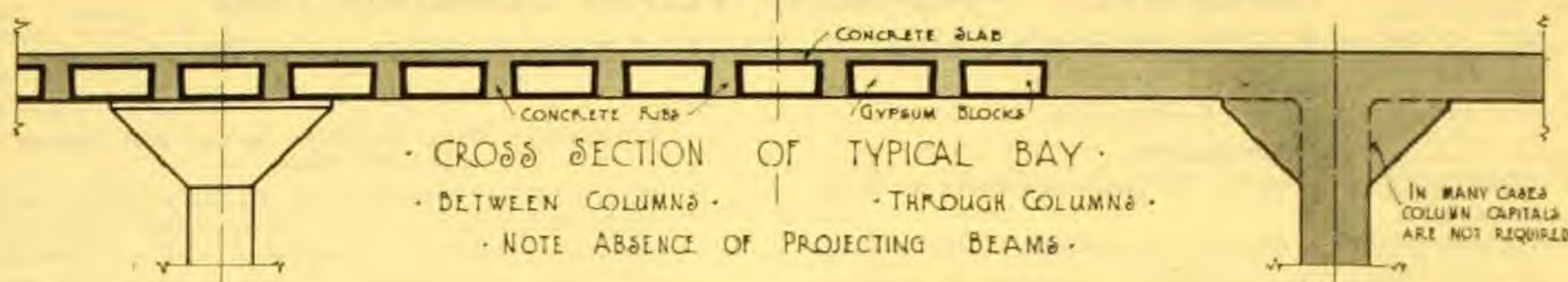
RAMSAY'S CATALOGUE



(A)

# "INNES-BELL" TWO-WAY FLAT SLAB SYSTEM

(PATENTED)



• CEILING AFTER REMOVAL OF FORMING •  
• SHOWING ARRANGEMENT OF HOLLOW BLOCKS •

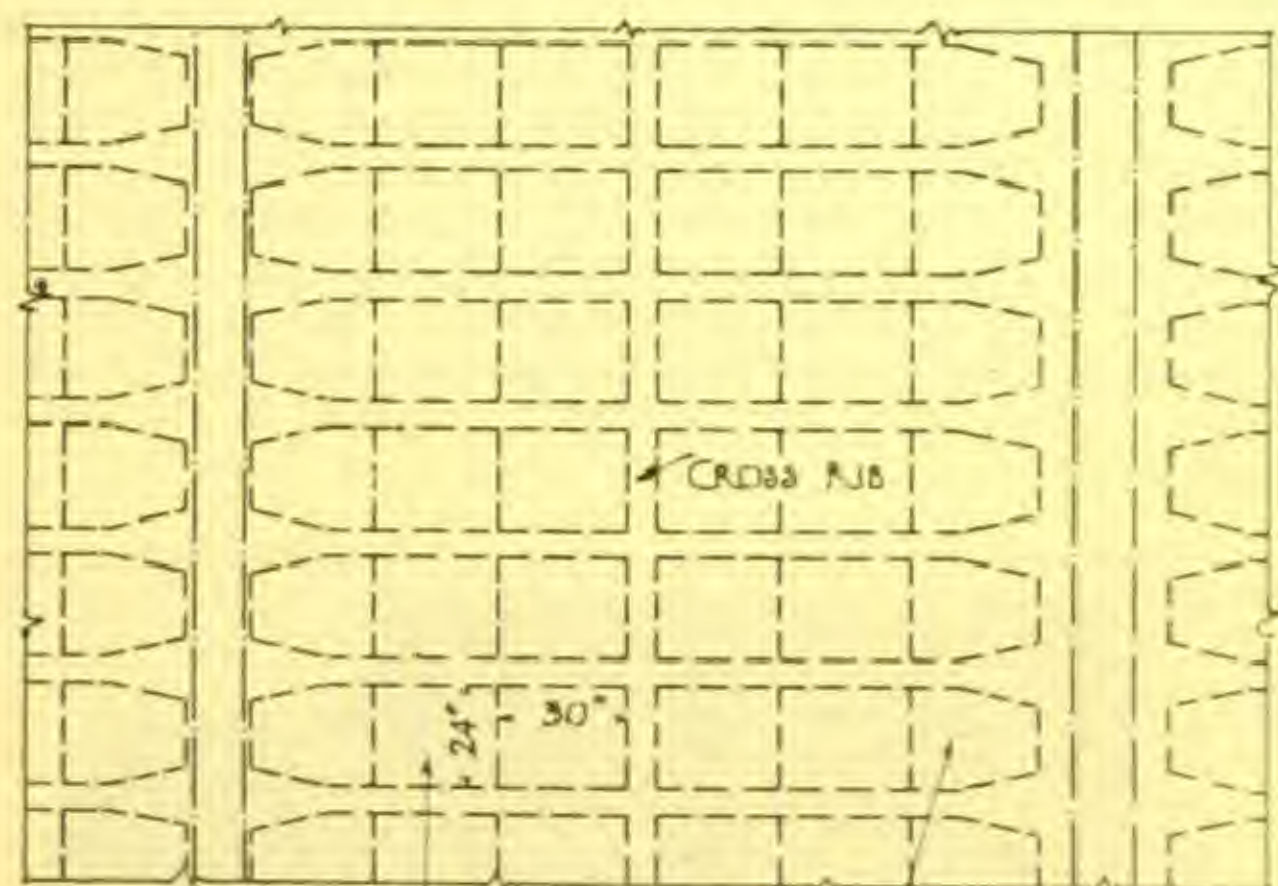
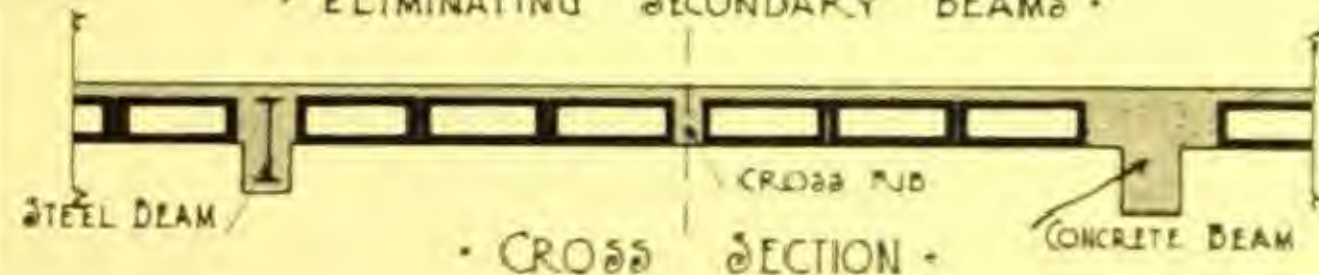


• CEILING AFTER APPLICATION •  
• OF PLASTER FINISH •

(B)

## ONE-WAY RIB SYSTEM

• ELIMINATING SECONDARY BEAMS •



• PLAN •

• NOTE TAPERED BLOCKS •

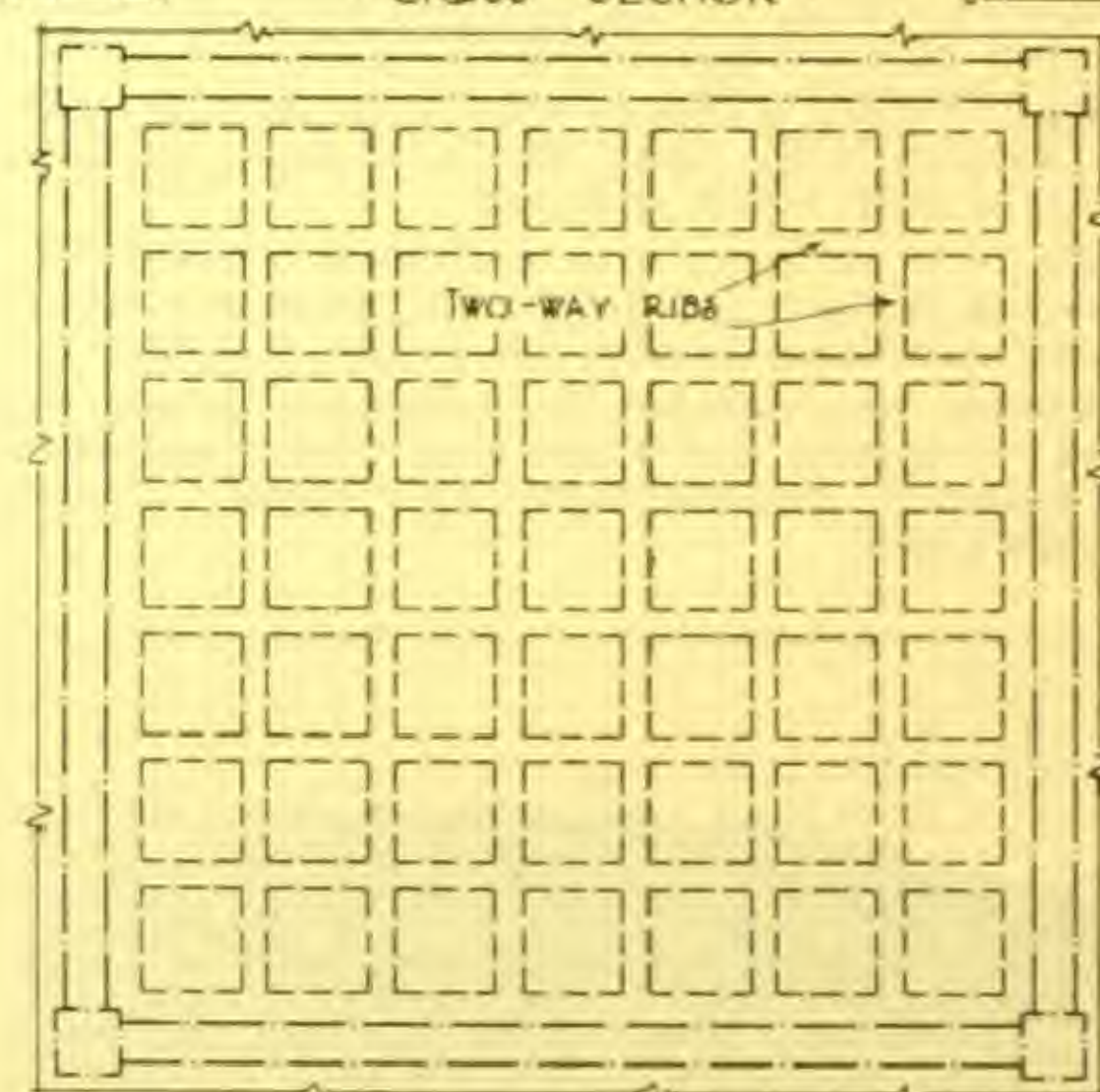
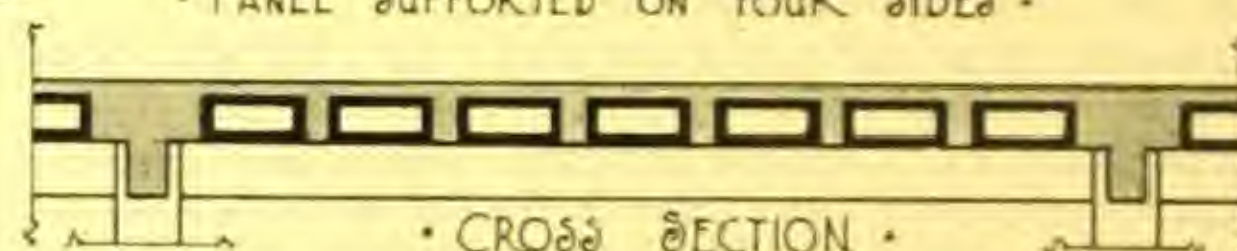
• SEE LETTERPRESS •

• BLOCKS TWO FEET WIDE ARE RECOMMENDED •  
• FOR ECONOMY •

(C)

## SQUARE SLAB SYSTEM

• PANEL SUPPORTED ON FOUR SIDES •



• PLAN •

• THIS SYSTEM IS APPLICABLE TO •  
• SQUARE OR NEARLY SQUARE PANELS •

VICTOR-GYPSUM  
HOLLOW BLOCKS  
(PATENTED)

**FIREPROOF FLOOR CONSTRUCTION**  
**AUSTRALIAN GYPSUM PRODUCTS PTY. LTD.**  
**ALL STATES AND NEW ZEALAND**

INCORPORATING  
INNES-BELL  
SYSTEMS

The method of building known as the "Innes-Bell" System, which includes the use of tapered end blocks, is protected by the Patent No. 12151/1923, and any unauthorised use of the system will be rigorously contested. The Victor-Gypsum Hollow Floor Block has also been patented in respect of all shapes and sizes (Letters Patent 11170/28). Legal proceedings will be taken against any unauthorised maker or user of such Blocks.



## SECTION C

[Containing S.A.A. Filing Sections No. 11]

### PAVING





# GENOA TERRAZZO CO. PTY. LTD.

11a

S.A.A. File No.

## Floor Finishers and Pavers

152 CANNING STREET, CARLTON  
VICTORIA

### TERRAZZO PAVING

#### Floor Finishing

The Genoa Terrazzo Co. Pty. Ltd. are specialists in the installation of concrete floor finishes and paving, their experience extending over many years and including numerous successful operations in Victoria. The types of floor finishes and paving which the Genoa Terrazzo Co. Pty. Ltd. are equipped to lay include the following:—

- Granite Concrete Floor Finish.
- Terrazzo Floor Finish.
- Ironite Floor Finish.
- Coloured Finishes.
- Granolithic Paving.
- Pre-cast Terrazzo Flags, Treads, risers, wall panels, sink tops, etc.
- Driveway and footpath one-course pavements.
- Concrete floors.



Entrance Hall to Shell Co.'s Building, Melbourne.

Floor laid in Terrazzo, including central design, stair treads and risers, by Genoa Terrazzo Co. Pty. Ltd.

#### Advisory and Contracting Services

In addition to laying concrete floors and floor finishes, the Genoa Terrazzo Co. Pty. Ltd. will submit designs and estimates; their long experience in this field enables them to be of great assistance to architects and others who contemplate laying concrete paving of any description.

Although the Genoa Terrazzo Co. Pty. Ltd. will lay finishes on concrete sub-bases which have been put down by others, they advise that the sub-base should be included in their contract, because a successful floor depends to a great extent upon the correct relationship between the construction joints in the sub-base and finish. Under these conditions the company will guarantee their work to remain free from unsightly cracks or other defects.

### ARCHITECT'S SPECIFICATION

#### GRANITE CONCRETE FLOOR FINISH

**CEMENT.**—The cement used shall be an approved brand of Portland cement complying with the current Australian Standard Specifications for Portland cement.

**AGGREGATES.**—The whole of the aggregate used shall be free from dust or other foreign matter.

Granite chips shall be obtained from Genoa Terrazzo Co. Pty. Ltd., of the dimensions to pass a sieve having apertures measuring  $\frac{1}{4}$  inch in the clear.

**Note.**—Granite chips, due to their cuboid shape, present a harder and larger wearing surface than the usual bluestone toppings ( $\frac{1}{4}$  inch) which, if examined, will be found to be in thin, easily broken flakes.

**WATER.**—Water shall be clean, free from oil, acid, alkali or vegetable matter.

#### WORKMANSHIP

**CONCRETE BASE.**—The concrete base shall have the surface left rough, screeded to form key for the floor finishing. The whole of the concrete base shall be thoroughly cleaned free from dust and all loose matter and well wetted immediately before placing the granite finish.

**PROPORTIONS.**—The granite floor finish shall consist of one part Portland cement, two parts granite chippings. The ingredients shall be mixed dry in a mechanical mixer, and then sufficient water added to make a workable mixture of driest consistency.

**PLACING.**—The surface of the concrete base shall be roughened, cleaned down and saturated with water and a thin coat of cement grout spread on. The finishing course shall be placed immediately after mixing.

Provide and fix expansion boards or slips at intervals of not more than 12 feet both ways, and removed at completion, filling up the cavity with concrete and making good the surface with V-joint.

**FINISHING.**—After the finishing course has been screeded down to the required thickness, it is to be worked with a wood float to give an even level surface, and then immediately trowelled with a steel float before the initial set has taken place. After this trowelling the surface shall not be disturbed.

**COLOURING.**—If artificial colouring is used, it shall be incorporated with the entire finishing layer and shall be mixed dry with the cement and aggregate until of uniform colour. Use metallic oxides only.

#### TERRAZZO FLOOR FINISH

##### MATERIALS

**CEMENT.**—The cement used shall be an approved brand of Portland cement complying with the current Australian Standard Specifications for Portland cement.

**AGGREGATE.**—All aggregate shall be supplied by Genoa Terrazzo Co. Pty. Ltd., and consist of marble chips of uniform colour (or state colour and pattern desired), free from dust, dirt, or other impurities, and of sizes so that the greater portion of the chips will vary from  $\frac{1}{4}$  inch to  $\frac{1}{2}$  inch, and none to be over  $\frac{1}{2}$  inch.

**WATER.**—Water shall be clean, free from oil, acid, alkali or vegetable matter.

##### WORKMANSHIP

**GENERAL.**—The whole of the "Terrazzo" Floor Finishing work is to be carried out by the Genoa Terrazzo Co. Pty. Ltd., which will be required to supply all material, labour and appliances necessary to complete and finish the whole of the Terrazzo work to approval.

**PLACING.**—The concrete sub-base shall be thoroughly cleaned from all dust and loose matter and, immediately before placing Terrazzo, thoroughly saturated with water, and then spread with a very thin layer of cement grout.

The following proportions shall be used:—one part cement, two parts marble chips.

The Terrazzo finish shall be  $\frac{3}{4}$  inch thick, of the above proportions, and shall be so laid that the finished surface shall show approximately 85 per cent. of marble.

**FINISHING.**—When the Terrazzo has set sufficiently, it shall be surfaced with electric rubbing machines and by hand where not accessible to machine, using a coarse stone (power for these machines to be supplied by sub-contractor).

Grout surface with pure cement, forcing same into all pores and voids.

At the final surfacing the floor shall be finished with a fine stone to a true and smooth finish.





# THE SHELL COMPANY OF AUSTRALIA LIMITED

HEAD OFFICE: MELBOURNE

Branch Offices: Adelaide, Sydney, Brisbane, Perth, Hobart, Wellington, N.Z.

11d

S.A.A. File No.

[For Other Products, See Page 371]

## MEXPHALTE

### Description

The various grades of Mexphalte and Spramex (which is the softest grade) are bitumens produced from asphaltic base oils, and are used throughout the world in the different types of paving and road construction. Bitumen is now generally used for the various purposes where previously tar was employed, since it is realized that the slight increase in primary cost cannot be considered when the life (and hence maintenance costs) of the two substances are compared, as bitumen is practically unaffected by weather conditions, but tar definitely deteriorates in time.

### Uses

Obtainable in eleven different grades, Mexphalte is used in all cases where bitumen is employed, such as the binder and waterproofing medium in damp-proof courses and waterproofing

membranes, and for tennis courts, paving, footpath and road construction, etc.

The architect, safe in his knowledge of the integrity and service of the Shell Organisation, can with confidence simply specify "Mexphalte" (where in the past he has just specified "bitumen") and thereby obtain the correct grade of a material which he can be sure will give entire satisfaction when used in any of the foregoing cases.

### Bituminous Paints

Mexphalte is the bitumen incorporated in the following products:—

- (1) Shell Bituminous Paint—for preserving exposed iron work.
- (2) Shell Bituminous Cementing Paint—for the many purposes that require an adhesive medium.
- (3) Shell "Boiler Compound"—for the cold application of a semi-plastic waterproof medium and for preventing the infiltration of air through brickwork.

## COLAS

### Description and Uses

Colas is a chocolate-coloured liquid of a consistency slightly heavier than water, and is manufactured by a patented process which specially prepares bitumen in order that it may be used without heating. It is ready for immediate use and may be applied to wet surfaces as well as to dry. Colas needs only to be poured upon the surface, drawn out evenly by a broom or rubber squeegee, and covering with clean sand to give an excellent bitumen dressing on any suitable surface. It is thus particularly suitable for surfacing gravel drives, tennis courts and repairing existing paths, and as a covering material for concrete, wood or stone paving areas.

### Preliminary Preparation of Sub-bases

The following preparation may be necessary to bring the existing surfaces of drives or paths into a suitable condition prior to surfacing with Colas.

The area should be weeded and all the roots removed. As the surface after treatment will be waterproof, provision must be made to dispose of rain water by gutters or drains. Humps should be trimmed down to the desired level, and any large "pot-holes" cut out so as to obtain vertical sides to the hole, which should be painted with Colas and then clean toppings or gravel mixed with Colas (so that the surfaces of the individual particles are only just covered) immediately packed into the hole, rammed down, and finally given a coating of sand. Alternatively, the holes could be filled with clean toppings or screenings, which are consolidated by watering and ramming, and a light coat of Colas poured into the voids of the surface, which is then covered with sand and again rammed.

### The Construction of New Paths or Tennis Courts

Drainage should be given consideration as indicated in the previous paragraph.

Excavate to 2 in. or 3 in., depending on local conditions. Spread  $\frac{1}{2}$  in. screenings and consolidate well by watering and rolling, so that the finished surface is of the required grade and camber. Pour Colas uniformly over the area, from a pouring can fitted with a Colas Pouring Baffle, at the rate of one-half to three-quarters of a gallon per square yard. Cover with clean toppings (one cubic yard covering approximately 80 square yards) and roll well. The following day excess dust should be swept off, and a further coat of Colas broomed over the surface so that one gallon covers from 4 to 5 square yards. This must be immediately covered with clean coarse sand (one cubic yard to 180 square yards) and rolled again. The surface will improve after a few days under traffic, but if a very fine-grained finish is required for a tennis court, a further coat of Colas swept out with a rubber squeegee, so that one gallon covers 10 square yards, should be applied, and immediately covered with bluestone dust and rolled again.

### Colas for Repairing Old Asphalt Paths, Etc.

If necessary, existing surfaces should be prepared as indicated in the Preliminary Preparation of Sub-bases.

Apply Colas direct from a can fitted with a Colas Pouring Baffle or from a container, and distribute Colas with an old broom or rubber squeegee at the rate of one gallon of Colas to 5 to 8 square yards. Do not sweep to and fro, as this will cause premature settling out of bitumen. Cover dressing immediately with clean coarse sand and lightly broom sand uniformly over the surface and finish by rolling.

### Delivery Service

Colas is available in 4 gallon tins and 44 gallon returnable iron drums, and is delivered by road or placed on rail as required. For road work, Colas is sprayed accurately to specification from power bulk waggon of 1,000 gallons capacity.



A COLAS TENNIS COURT

Owing to the ease of application, Colas is now generally substituted for hot bitumen in the construction or surfacing of tennis courts.



AN IMPERVIOUS, DURABLE  
GRAVEL DRIVE

A gravel drive constructed by the Colas process has the advantages of appearance and colour of gravel without the disadvantages of constant maintenance and repairs. For this special treatment and modern method consult the Shell Co. of Australia Ltd.



AN INTERIOR MEXPHALTE FLOOR

After consideration of the various conditions to be fulfilled, it will be found that a Mexphalte area is the most suitable and economical.



# BROOKS, ROBINSON & CO. LTD.

ELIZABETH STREET, MELBOURNE

WORKS: MAFFRA STREET, SOUTH MELBOURNE

Telephone M 3131 (5 lines)

LUXFER

11 j

S.A.A. File No.

[For Other Products, See Pages 95, 141, 172, 235 and 468]

## PAVEMENT, FLOOR AND STALLBOARD LIGHTS

### Luxfer Lights

The Luxfer Company were the first people to realise the value of making Pavement Lights of more importance to architects and building owners than mere blocks of glass set in cast-iron frames.

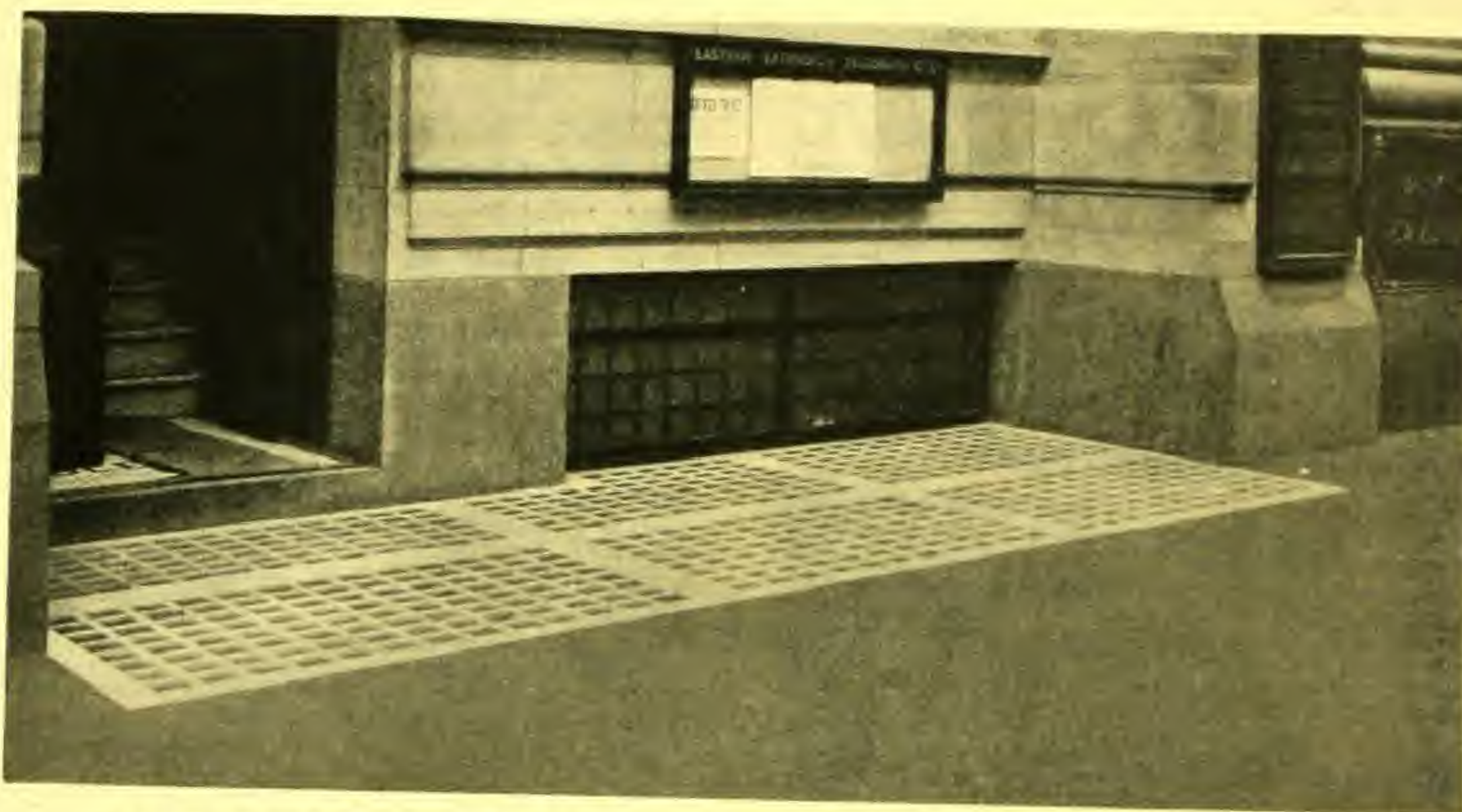
They saw that by scientific treatment, Pavement lights, Floor lights and Stall-board lights could be made to give a marked improvement in the daylighting of basements and other rooms not having a direct source of light from windows or skylights.

### Luxfer Lenses

In the design of Lenses for pavement, floor and stall-board lighting, the following requirements should be observed:—

- They must admit the passage of the largest amount of light.
- They must direct the light as required.
- They must present the best wearing surface to all the hard wear and rough usage to which Pavement Lights are subjected.

The design of "Luxfer" lenses is such that (a) and (b) are fulfilled to the fullest possible degree, and the material from which they are made (a special wear-resisting glass known as "R." glass) insures satisfactory service.



Pavement and Stallboard Lights—Eastern Telegraph Building, Melbourne.

### Two Types of Construction

Pavement lights usually consist of glass blocks set in metal or concrete frames. The Luxfer Co., after many experiments, made their choice of Cast-iron frames as being the better, for the following reasons:—

- The frames, in cast iron, could be made with astragals of sufficient size only to provide for suitable rebates to receive the lenses, and thus have least obstruction to daylight.
- A stronger and more reliable frame resulted owing to the elimination of the human element in misplaced reinforcing rods and badly mixed concrete.
- Astragals could be staggered to obtain the best lighting effect in the basement.

Ferro-concrete frames (not to be confused with pre-cast concrete frames) consist of reinforced concrete astragals hidden from underneath by the lenses. These lights have their limitations and should not be used where they are exposed to heavy traffic or hot sun. They are, however, invaluable when used in a concrete building as floor or roof lights where they are shaded from the direct sun rays. Maximum opening, 15 superficial feet, Maximum width, 3 feet.

### Installation

As the success of a pavement floor or stall-board lighting installation depends to a great extent on accurate installation, Brooks, Robinson & Co. Ltd. recommend that architects should specify installation by their own staff of workmen, who are experienced and equipped to successfully handle such work.

Wherever possible pavement and roof lights should be given a fall of at least 1 in 12, but in some cases 1 in 20 is sufficient.

### ARCHITECT'S SPECIFICATION

#### PAVEMENT LIGHTS.

Pavement lights, where shown on plans, shall be "Luxfer" Pavement Lights in Cast-Iron (or Ferro-Concrete) frames, with (state whether iron, coloured or non-slip cement; mosaic or terrazzo; tiled) surface between lenses.

Pavement lights shall be supplied and installed complete by Brooks, Robinson and Co. Ltd.



**B. G. PLUMMER & Co.****2 PARKER LANE, HAYMARKET  
SYDNEY****BAR  
LOCK**

Manufacturers of "BAR-LOCK" Transparent Roofing (Skylights), Cast-Iron and Concrete-Framed Pavement Lights, Stall-Board Lights, also Salignum-Wood and Stone Preservative, White Ant and Borer Protectors, etc.

**11j**

S.A.A. File No.

**"BAR-LOCK" TRANSPARENT ROOFING****Materials and Construction**

Bar-Lock Transparent Roofing is strong and safe, being fireproof, burglarproof, weatherproof and entailing no maintenance cost. It is built of the strongest type  $\frac{1}{2}$  in. thick wired glass set in a reinforced concrete construction  $\frac{3}{4}$  in. thick. It will carry safely a distributed load of 200 lbs. per square foot on a clear 8 foot span, and can therefore be used as a roof garden and for light foot traffic.

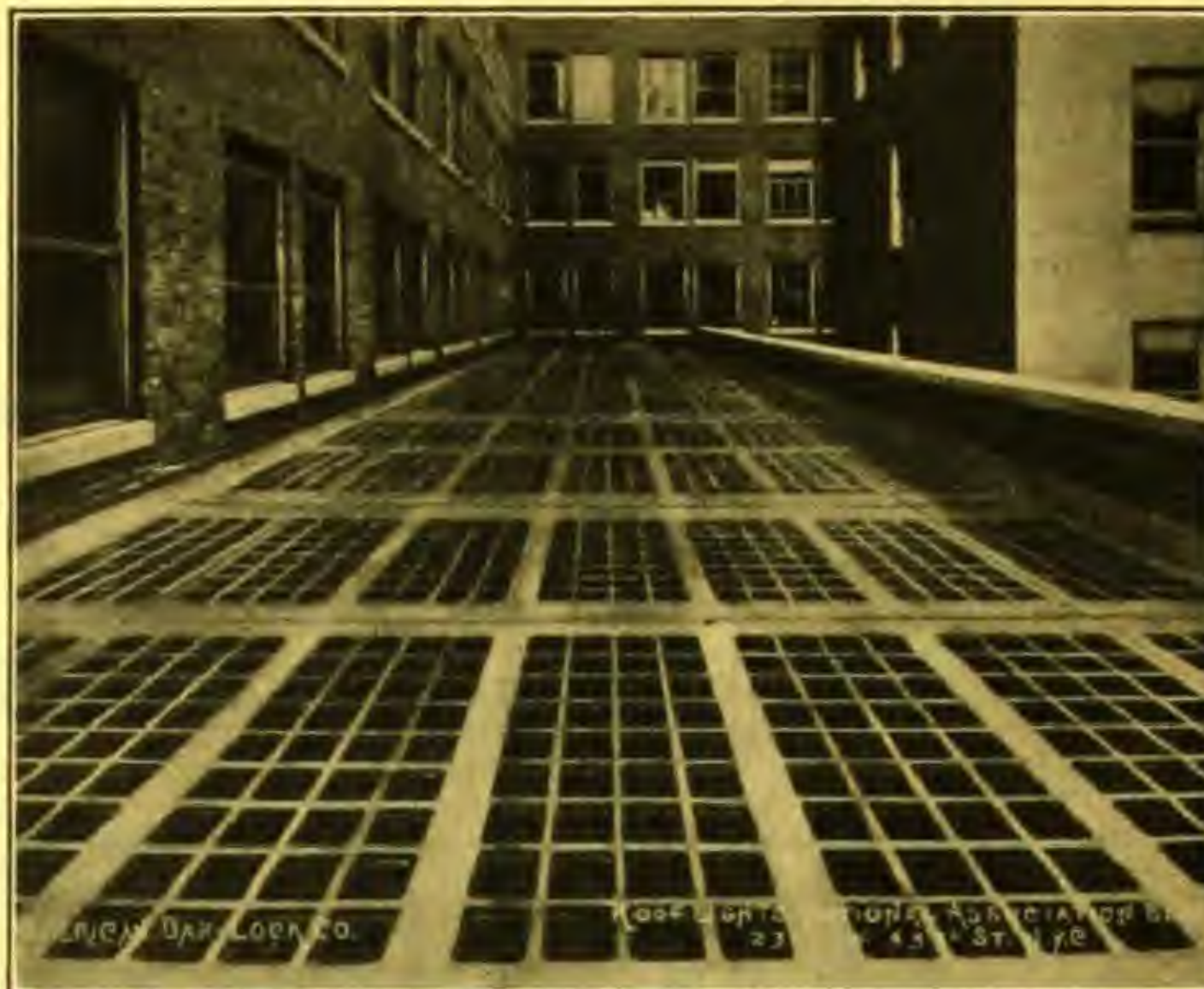
**Specifications**

All skylights and areas designated to be of Transparent Roofing, as supplied by B. G. Plummer & Co., Sydney, shall be as follows:  $3\frac{1}{2}$  in. thick concrete construction, reinforced longitudinally and transversely with steel reinforcing rods spaced  $9\frac{5}{8}$  in. centres. The glass shall be standard  $\frac{1}{2}$  in. thick wired  $8\frac{1}{4}$  in. square, set in a cushion of tar and sulphur compound protected by  $8\frac{3}{4}$  in. galvanized cast iron shields.

There shall be no exposed metal on the under-surface. Expansion joints shall be made around and extend to the bottom of the slabs, and filled to the top with a special caulking compound to prevent leakage.

**Special Features**

Bar-Lock Skylights are the only concrete framed skylights provided with a patent galvanized cast iron shield and mastic filling round each lense. These exclusive features eliminate breakage caused from expansion and contraction. On the other hand, should a breakage arise through accident or excessive abuse, the same exclusive features enable a new lense to be replaced quickly and easily without interfering with or damaging the concrete frame. These are big advantages and are worth special consideration.

**Service to Architects**

Special details of transparent roofing for any type of building construction will be furnished on request. We will be glad to give any information which may be required and quote prices.

**Typical Installations**

*Parkes House, Hunter Street, Sydney.*  
*Union Bank, Head Office, Pitt and Hunter Streets, Sydney.*  
*A.M.P. Society, Goulburn, N.S.W.*  
*Messrs. Lawrence & Hanson's Premises, Brisbane.*  
*The Morris Hotel, Pitt Street, Sydney.*  
*Watson's House, Bligh Street, Sydney.*

**PAVEMENT AND STALL-BOARD LIGHTS****Cast-Iron Frame Pavement and Stall-Board Light**

These pavement and stallboard lights are especially constructed to provide maximum lighting and proof against extreme conditions of weather and use.

By referring to the drawing it will be seen that the method of construction consists of specially shaped glass prisms and lenses set with mastic putty in cast iron frames, which, by virtue of the great strength of cast iron, allows for very small sections, consequently increasing the glass area and reducing light obstruction to a minimum. The upper surfaces of frame are nibbed to provide non-slipping footholds and resistance to wear. The prisms and lenses, which are *specially annealed*, are spaced as shown for good diffusion of light. The lenses transmit the light downwards, while the specially designed prisms project the light well back into the basement. Should breakages, due to accident or excessive abuse, occur, new glasses are easily and cheaply installed, without showing signs of repair. The *specially annealed* glass, which is very strong, combined with the mastic putty, which allows for expansion and contraction, reduces the possibility of breakage in these lights to the absolute minimum.

**ARCHITECT'S SPECIFICATION**

Where shown on drawings, furnish and install cast-iron frame pavement and stallboard lights as supplied by Messrs. B. G. Plummer & Co., Sydney.

The pavement lights shall consist of 4in. x 3in. prisms and lenses  $\frac{3}{4}$ in. thick at supporting edges, set with mastic putty in cast-iron frames, which shall be laid in rebated .....curbs, on a  $\frac{1}{2}$ in. cement bed with special jointing compounds between vertical faces of frame and curb, as shown in details. Stallboard lights shall consist of 5 $\frac{1}{2}$ in. x 5 $\frac{1}{2}$ in. x  $\frac{1}{2}$ in. thick lenses, set into cast-iron frames with mastic putty and cement backing, and intersection with pavement lights shall be made as shown on details with special waterbar and .....X..... inch supporting angle.

(Continued on next page)

RAMSAY'S CATALOGUE



### Service

Pavement and stallboard lights can be assembled on the job, or made in sections at our works and delivered to where required. Any further information will be supplied on request, and prices quoted. Pavement and stallboard lights are made up to suit any size area without additional cost. An extra charge is made for irregular shapes, such as rounds, ovals, checked frames, etc.

### Typical Installations

*Herald Office, Sydney.*

*Commercial Banking Co. of Sydney; Head Office, Sydney.*

*Government Savings Bank, Brisbane.*

*Commonwealth Bank, Brisbane.*

*Kembla Building, Sydney.*

*T. & G. Building, Sydney.*

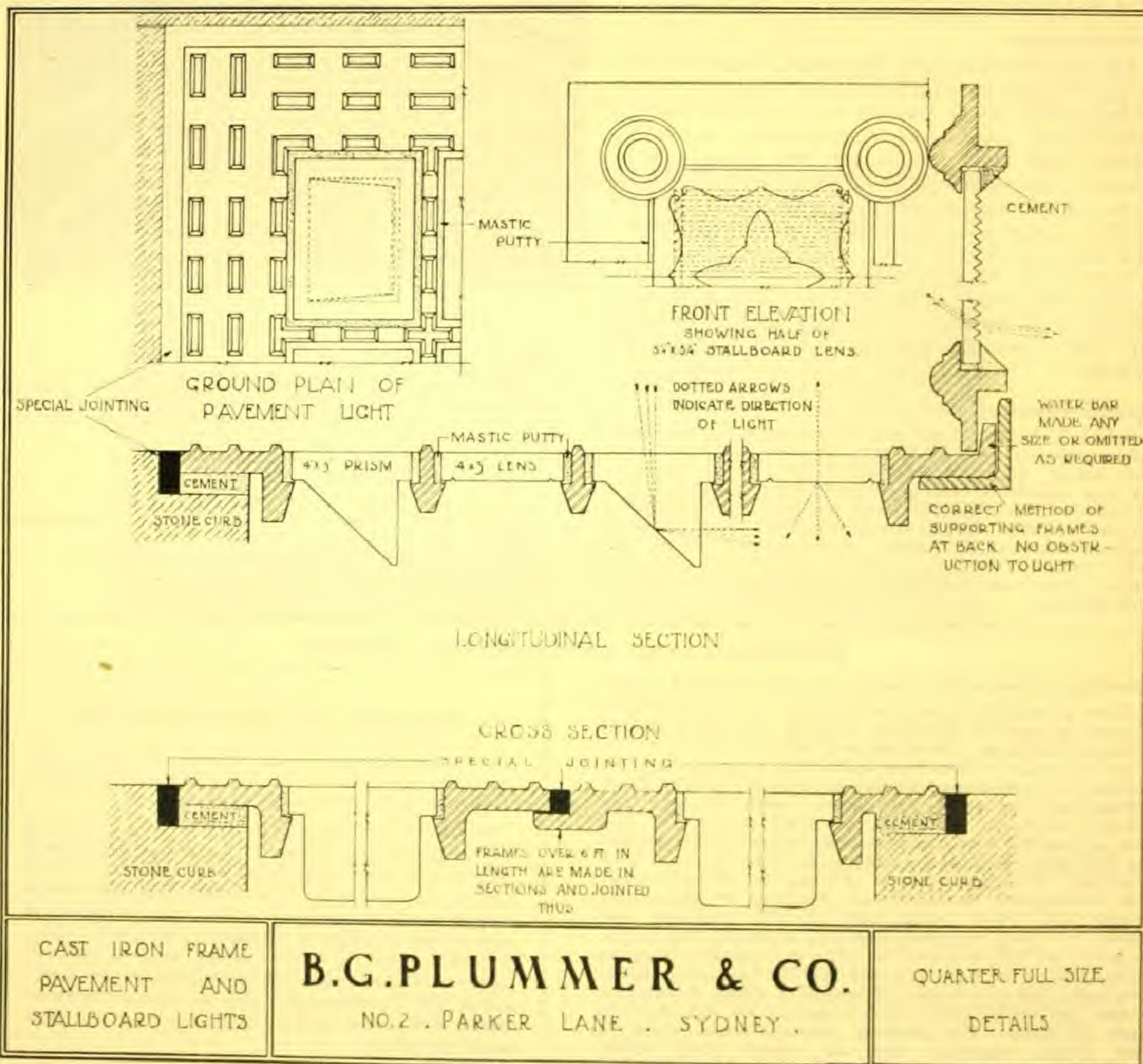
*St. James' Theatre, Sydney.*

### Solignum Wood Preservative

Solignum Wood Preservative and White-ant Destroyer has proved itself to be a valuable preserving stain for any timber structure. Solignum penetrates the wood and so destroys the causes of decay from inside, in addition to affording adequate protection against outside influences, whereas paint on tar does not prevent decay inside the wood, but, by sealing the pores, actually accelerates internal decay in sappy or unseasoned timber.

This preserving stain is obtainable in green and brown shades, and when applied intensifies the natural grain of the wood, the flat mellow finish harmonising with natural surroundings. Timber which has been solignumed will resist the attacks of white ants and borers, and used in stables and outhouses will keep off rats, bugs and all kinds of objectionable pests. An important advantage which Solignum has over other preservatives is that treated timber is not rendered more inflammable.

Solignum is applied by brush, and covers 350-400 square feet per gallon.





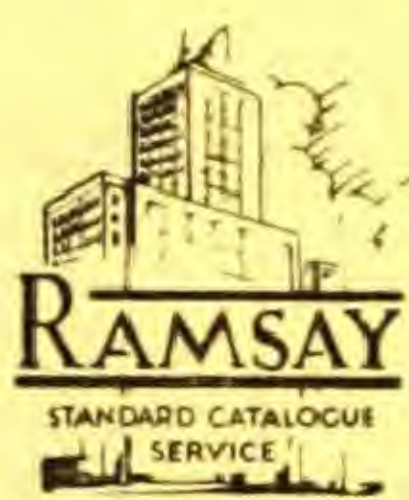
## SECTION D

[Containing S.A.A. Filing Section No. 12]

### ROOFING, SHEET METAL

— and —

### SKYLIGHTS





12a

S.A.A. File No.

# THE FEDERAL VAL-DE-TRAVERS ASPHALTE CO. LTD.

CONTRACTORS TO N.S.W., QUEENSLAND AND TASMANIAN GOVERNMENTS.

Registered Office and Works:  
REDFERN, N.S.W.Distributors or Associate Company:  
ASPHALTES AND ALLIED PRODUCTS LTD., BRISBANE, QUEENSLAND.

## Products

Suppliers of and specialists in laying all forms of highest grade natural rock asphaltes, including:—

Waterproofing.

Damp-proofing—Damp-courses of all kinds.

Flat roofs.

Floors, including all kinds non-disintegrating and acid-proof pavements.

Insulations.

Suppliers of bitumen (various grades) and application of same in many forms, including insulation and preservation, including water and acid resistant constructions.

Manufacturers and suppliers of high-grade bitumen paint, also special bituminous paint, marketed under trade name of "Trinol."

Manufacturers and suppliers of bitumen compounds for electrical work.

## CLASSIFIED APPLICATIONS

### (a) Water and Damp-proofing.

Natural rock asphalt used as the base for water and damp-proofing applications has an indefinite life. Being a natural rock centuries old, when mined, its quality and durability and efficiency are world-famed. Effective application, however, depends to a large extent on the conditions under which the work is expected to be carried out. The location of the water or damp-proof layer is an important consideration. Where possible, and particularly in the case of water-proofing, the material should be so applied that any pressure from a head of water will have the effect of forcing it on to, and not off, its base. Fig. 1 gives an illustration of the application of a water-proofing rock asphalt skin to a cellar which is situated away from the party walls of the building itself.

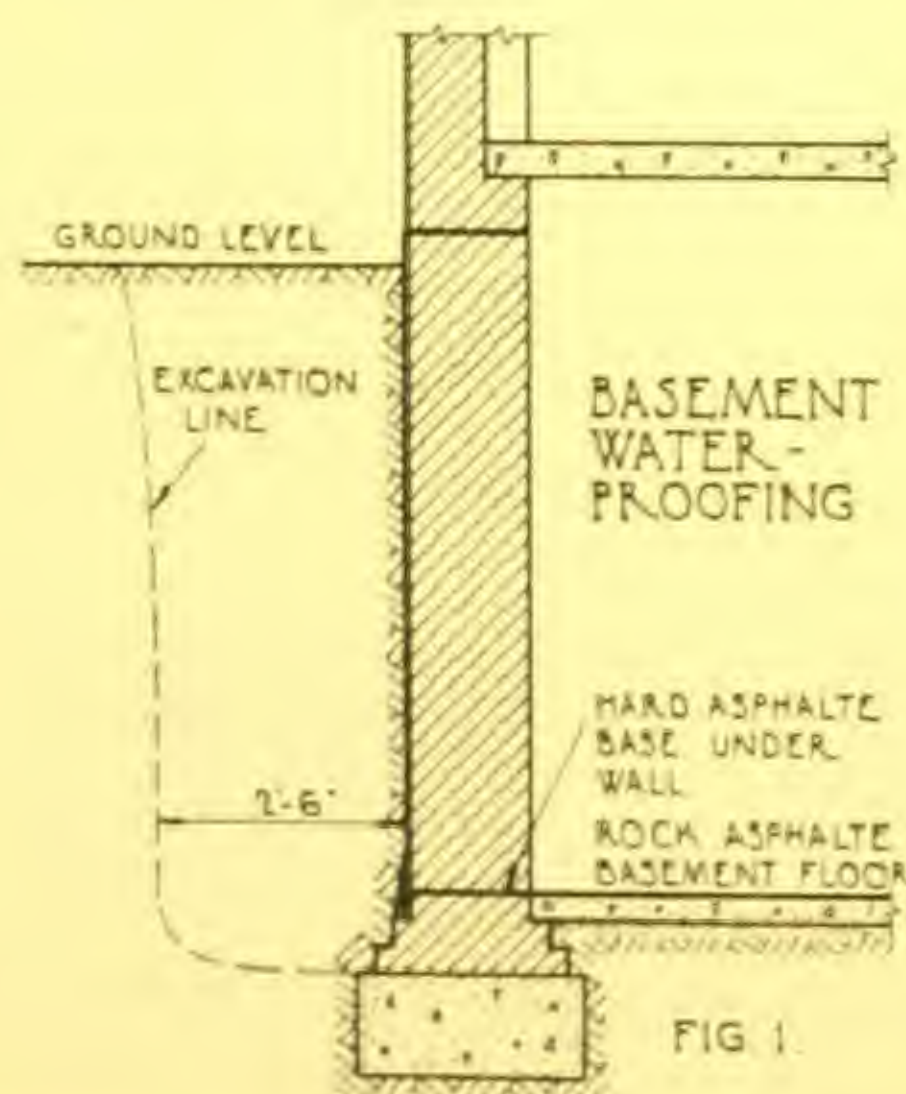


FIG. 1.

This construction involves, probably, a small additional amount of excavation, but means that the usual "outer" wall is no longer necessary. In addition, any water at the back of the wall tends to further compact the asphalt skin. The greatest gain, however, lies in the fact that (as happens in many cases), should a head of water equal to

the full height of the cellar be experienced, it is possible to test the cellar against this contingency before the cavity at the back of the wall is filled in, thus ensuring a 100 per cent. efficient job. The unusually large fillet joining the vertical with the horizontal work is not possible if asphalt skin is placed inside, hence the gain in strength at the weakest point in any similar construction, viz., a 90 deg. change of direction. The filling introduced into the cavity should not be such as to damage the asphalt skin, i.e., sharp-pointed boulder, etc.—ordinary earth from the excavation being quite efficient. In this and all other cases, water and undue dampness should be rigidly excluded during the application, and, where placed on the inside of outer walls, until the inner or protecting wall is completed.

- (1) For ordinary damp-course work— $\frac{1}{2}$  in. work laid in two coats.
- (2) For water pressure work— $\frac{3}{4}$  in. work laid in three coats.

### Flat Roofs

#### (a) On Concrete Base.

The use of natural rock asphalt for flat roof coverings has been practised for centuries. The quality of durability is so pronounced that no other form of roof covering can approach rock asphalt in respect to length of life and freedom from maintenance. It is an ideal product for use in our Australian climate. Highest efficiency in roofing work is attained by strict attention to important details, some of which are related to the particular base upon which the asphalt cover is to rest. Summarising, these items include:—

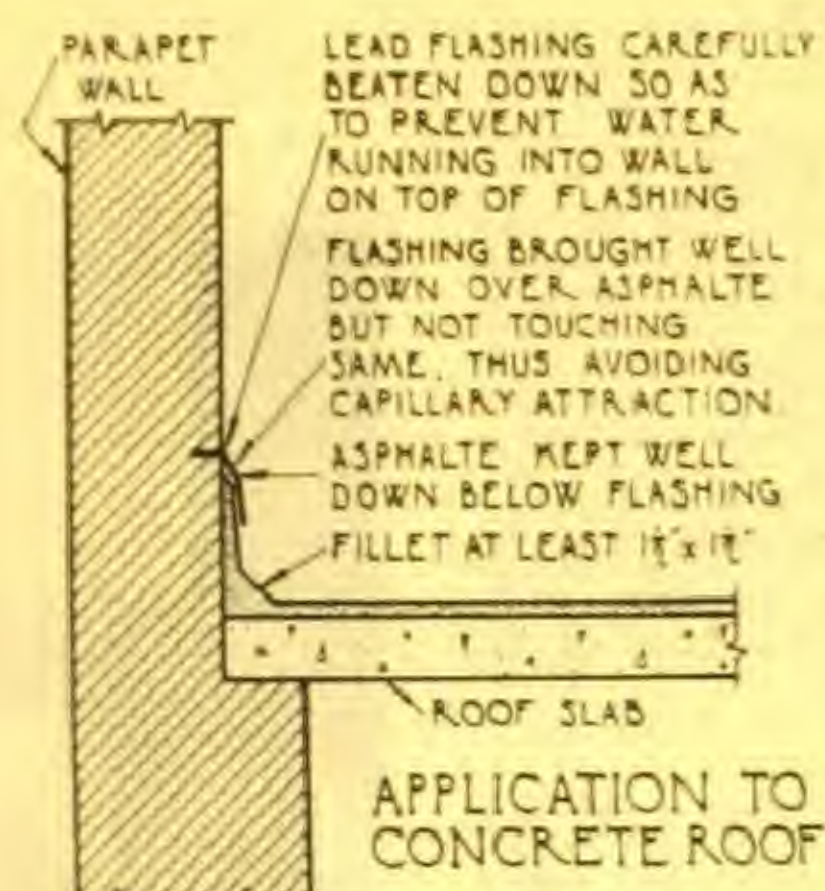
- (1) Condition and finish of concrete base.
- (2) Falls, etc., in the concrete base.
- (3) Provision for flashing gutters, outlets, etc.

Rock asphalt should not be laid on green concrete, but it may, to advantage, be applied to a semi-green surface. The finish of the concrete base should be reasonably free from air pockets or pores, and it is a wise precaution to cement grout (by "bagging," etc.) any porous formations prior to asphalt application. All falls (ideal being about 1ft. in 40ft.) should be incorporated in the concrete base, and surfaces of same must be uniform and fit to receive the asphalt in every way. Care in design and execution of work should be exercised at those points where weaknesses, if any, will occur, viz., gutters, fillets, outfalls and flashing. All joints linking up the flat work

(Continued on next page)



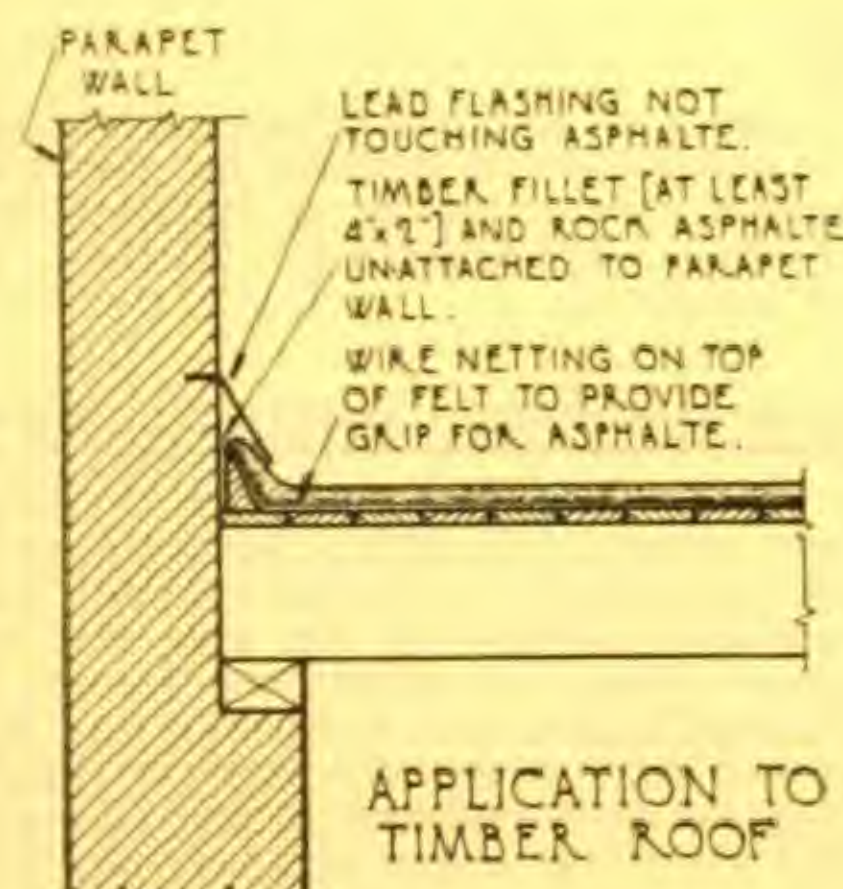
with the turn up the parapet should be filleted or coved. If leads to outfalls are to be asphalted, adequate space should be provided in parapet wall for trowelling facilities. If metal leads through parapets to outfalls are to be used, care should be taken to ensure that no water can percolate or force its way between the contiguous surfaces of the metal and the asphalt. The important factor of capillary attraction should also not be overlooked, as often water has found its way up the flashing and beyond the limits protected by the asphalt. Illustrations are set out as under:—



Specifications covering roof work should not include for less than  $\frac{1}{2}$  in. total thickness finished work. Roofs may be quite efficiently laid in one coat, although the generally accepted practice is to specify two-coat work. If two-coat work, all joints to be staggered and not to be closer than 6 in.

#### (2) On Wood or Timber Base.

The application of rock asphalt to wooden roofs is somewhat different from that required for concrete. All timber must be covered by a protective material to prevent adhesion to the wood, which is liable to shrink and to show up any irregularities in the asphalt surface. This protection may be one of several materials, viz., paper felt, hessian, or strong tough brown paper. The asphalt covering itself is generally of a greater plasticity than for concrete bases, so that any tension due to shrinkage of the timber may be adequately provided for. Owing to this shrinkage factor, the asphalt should not be connected or joined on to parapet walls, which do not shrink, but the construction should be as follows:—



#### Factory Floors

Rock asphalt floors provide a homogeneous, semi-plastic, non-disintegrating covering of indefinite life. They are waterproof and dustless, and provide an ideal base for employees to stand on, as compared with concrete. They can be designed for both heavy and light traffic, and are eminently suitable for industrial use. Floors of this material are used in every kind of factory and establishment, including:—

Paper mills and stores.	Stables.
Jam factories.	Magazines.
Bacon factories.	Food Factories of all descriptions.
Meat goods factories.	Flour mills.
Abattoirs.	Garages.

They can be removed and relaid in other positions—are easily repaired and renewed.

#### Acid-Proof Floors

These floors are required in factories, telephone exchanges and chemical establishments. They vary from the ordinary rock asphalt floor only in internal composition, and the specifications for ordinary rock asphalt floors apply.

#### Mastic Asphalt and Bituminous Applications

To those not prepared to make the outlay necessary to provide a rock asphalt roof, the mastic asphalt or bituminous covering offers a substitute with reasonable life. A mastic asphalt covering is composed of specially picked and graded aggregate compounded with a special grade bitumen laid hot and consolidated. A single one-coat skin  $\frac{1}{2}$  in. thick will provide watertightness for a very long time, and can be easily renewed when required. A bituminous covering is composed of bitumen only, spread over the concrete base in two coats of approximately  $\frac{1}{2}$  in. total thickness, covered with special graded aggregate over top coat when hot. The latter is the cheapest form of bituminous covering, and has a very fair life, and is easily renewed.

#### Bitumen Paints

Bitumen paint, manufactured by this Company to a proved English formula from picked raw materials, is a first-class product used for preservation and acid proofing purposes of all descriptions. For felt roof maintenance, etc., it is ideal, and has been used for this purpose for over thirty years.

### ARCHITECT'S SPECIFICATION

#### ASPHALTE ROOFS ON CONCRETE

Asphalt roofs shall be laid in two coats of 1 in. total thickness, to conform to contour of roof base in regard to gutters and outfalls, so as to maintain the necessary falls, etc. All right angle joints shall be filleted with  $\frac{1}{2}$  in. x  $\frac{1}{2}$  in. minimum fillet and turn up to be taken to within  $\frac{1}{2}$  in. of the line of the flashing. Use special precautions to ensure watertight conditions at outfalls.

#### ASPHALTE ROOFS ON WOOD

All surfaces shall be covered with protective material, viz., felt, etc., and, in addition, all inclined or vertical surfaces with suitable galvanized wire netting to provide grip for Asphalt.

All remaining factors to be as specified for Asphalt coverings on concrete surfaces.

#### ASPHALTE FACTORY FLOOR

Rock Asphalt floors shall be laid 1 in. ( $\frac{1}{2}$  in.) ( $\frac{1}{2}$  in.) thick (depending on the traffic) in one coat—all joints bolstered and made effectively homogeneous. All right angle joints shall be filleted.



12b

S.A.A. File No.

**D. & W. CHANDLER LTD.***The Biggest Hardware House in Victoria*234-236 FLINDERS LANE, MELBOURNE  
F 4175 (4 lines)276-294 BRUNSWICK STREET, FITZROY  
J 4145 (7 lines)

And At

Armstrong Street, BALLARAT  
Lava Street, WARRNAMBOOLHargreaves Street, BENDIGO  
Pynsent Street, HORSHAM

[For Other Products, See Pages 36, 120, 175, 251 and 484]

**MALTHOID PRODUCTS****Roofing**

Used in either flat roofs or in conjunction with tiles and slates, Malthoid roof waterproofing specifications safeguard building investments.

For flat roofs, Malthoid Standard Waterproofing Specification "A" is composed of alternate layers of Malthoid, sealed fast in a homogeneous mass, with flood coats of "Floatine" (special asphalt). The top surface is given additional protection by embedding pea-size gravel in a flood coat of "Floatine." These roofs will last 10 to 20 years without maintenance expense. Tiled roofs, underlined with Malthoid waterproof fabric, can be depended upon to withstand the heaviest rainfall and most severe windstorms without damage to interiors.

**Dampcourse**

Engineers with long experience of waterproofing problems recognise the adaptability of Malthoid in difficult construction work. Where assured protection is imperative in the waterproofing of cellars, foundations, parapets, window and door openings, etc., Malthoid Dampcourse security will be found permanent and complete.

Genuine Malthoid Dampcourse set in concrete is the perfect waterproofing for foundations at ground level.

Supplied in rolls of varying widths for foundations, parapets, etc., and applied in successive layers with hot "Floatine" for basements and the more severe places. Weight approximately 12 ozs. to the square foot. Compression test of over 20 tons to square foot produced no detrimental effects.

**Tennis Courts**

Five-ply Malthoid for re-covering tennis court surfaces, laid over hard-rammed earth or existing concrete or asphalt surfaces, is resilient, durable and dust-free. Maintenance expense is nil. Lines can be permanently marked on Malthoid fabric. It is superior to the playing quality of asphalt or concrete, and resembles very closely cut turf. The surface is very smooth and very fast, much more comfortable to the feet than asphalt or concrete. Balls bounce true without wearing their nap. From the point of view of continuous playing, Malthoid is superior to any other court.

**MALTHOID COURT.**

Asphalt surface in New Street, Gardenvale, re-covered with Malthoid. (Photo. by permission of Club Secretary.)

**Building Paper**

For insulating and sheathing against moisture, Pabco P. & B. Building Paper is strong-bodied, thoroughly saturated with asphalt. Use under roofing, behind shingles, between floors, within walls, for cellar lining, and for cold storage work. 1-ply, 2-ply, and 3-ply P. & B. Building Paper is obtainable in rolls 3 ft. wide containing 1,000 sq. ft.

**Shingles**

Pabco shingles, flexible, mineral-surface, and durable, are made in many shapes, and coloured in brown, green, slate, red and black. These shingles are waterproof and insulate temperature changes. The roof base, on which the shingles are fastened together with sturdy nails, should be close boarded. Write to us for detailed, illustrated information.

**Floor Coverings**

To protect concrete from "dusting" and such disintegration, specify a layer of 5-ply Malthoid, sealed fast to the cement.

Laying Malthoid on one of the flat roofs of the Vacuum Oil Co.'s depot at Portland.

This sturdy Malthoid fabric is obtainable in red, grey, brown, gloss black and green; it can be cleaned readily, will wear long, and lies flat without curling or wrinkling. It is a sound deadener, non-slippery, low in cost, and is acid resisting. If noise on wood floors resounds when underlying joists are set too far apart, double layers of 5-ply Malthoid may be laid for sound proofing.

For use on Factory and Office Floors and in the home. Di-electric strength of over 9000 volts.

**Estimates**

Built-up samples of Malthoid Floor Covering will be sent on request to architects and builders for submission to your clients, together with estimates of material and laying of Malthoid roofing, dampcoursing, flooring, and Pabco shingles and insulating.

**Chandler's Roofing Contract Department**

Problems such as provision for quick drainage—slope of the roof base—placing of outlets for rain water—and so forth, are factors on which depend ultimate waterproofing satisfaction, and on which we can give you sound advice and assistance. This is a subsidiary service to our contract department, which will undertake any Malthoid laying contract and carry it out with expert, willing workmen. We will supply detailed drawings of Malthoid waterproofing methods, and supervise every stage of the job, assuring satisfaction to you and your client.



12b

# PABCO PRODUCTS (AUSTRALIA) LIMITED

MALTHOID

S.A.A. File No.

REGISTERED OFFICE:

26 JAMIESON STREET, SYDNEY

## MALTHOID ROOFING AND BASEMENT WATERPROOFING

Genuine Malthoid Roofing has been used throughout Australia by leading Architects and Engineers for 25 years. Malthoid has been selected for more prominent buildings throughout the Commonwealth than any other fabric.

Malthoid Roofing is manufactured under the strictest laboratory supervision, four separate laboratories located throughout the factory testing its ingredients and the finished product, all the constituent parts being manufactured by the one company at one factory, assuring Architects of positive uniformity in waterproofness and maintained quality. Malthoid is not the same as others. It is

manufactured to a distinctly different formula which has given favourable results for over 25 years in Australia which proves it to be dependable waterproofing.

The blended coating used on Genuine Malthoid, composed of various grades of Floatine (a special waterproofing asphalt) is only produced by the manufacturers of Malthoid, who are the first commercial users of a refined pure petroleum asphalt. The distinction between Floatine, a special pure petroleum waterproofing asphalt, and native asphalts, etc., is fully described in a special booklet which will be gladly sent to the profession upon request.

### Qualities of Floatine

Floatine has proven itself in Australia, in tropical countries, and in Arctic countries, as unsurpassed for waterproofing purposes. It is refined by us in our own refinery under the supervision of men who have spent their lives studying and refining waterproofing asphalts. The unequalled qualities of Floatine are described in a pamphlet which we will gladly send to the profession to complete their files.

### List of Products

#### Malthoid Roofing

- " Floor Covering
- " Basement Waterproofing

#### Pabco Asphalt Saturated Felt

- " Fibre Roof Coating, heavy

#### Floatine Special Waterproofing Asphalt

P. & B. Preservative Paint, acid proof, waterproof.



Genuine Malthoid is branded with the Registered Malthoid Trade Mark.

### Standard Waterproofing

Malthoid Standard Waterproofing Specifications have been the standard in Australia for built-up roofs for many, many years. Nothing speaks higher than this for reasons why Malthoid alone should be used where dependable permanent waterproofing is desired.

Malthoid Standard Waterproofing Specifications are waterproof, light in weight, long-wearing and dependable. In every large city in the Commonwealth there are expert Application Agents for applying Malthoid Standard Waterproofing Specifications.

### Service to Architects

Waterproofing problems are many and varied. The manufacturers maintain a staff in Australia who have had long years of experience in waterproofing problems both here and abroad. The Application Agents of Malthoid Waterproofing Specifications have had years of experience in applying these specifications under normal and abnormal conditions. Practical assistance is offered to the profession by either of these two sources of specialised knowledge without any obligation to the architect, owner or contractor.

## WEIGHTS AND COVERING CAPACITIES OF ROOFING MATERIALS

### ROOFING

Malthoid Roofing is made in five weights:—

1-ply	averages 52 lbs. per roll
1-ply	averages 88 lbs. per roll
2-ply	averages 110 lbs. per roll
3-ply	averages 126 lbs. per roll
5-ply (extra heavy)	averages 145 lbs. per roll

A roll of Malthoid is 3 ft. wide and 72 ft. long (containing 216 sq. ft.) with the exception of 5-ply Extra Heavy, which is 75 ft. long (containing 225 sq. ft.).

### FELT

Pabco Asphalt Saturated Felt is made in two weights:—

No. 2	averages 48 lbs. per roll, 36 in. wide
No. 3	averages 50 lbs. per roll, 36 in. wide

No. 2 contains 324 sq. ft., and No. 3 contains 500 sq. ft. to the roll. The No. 2 weight is that most generally used in Australia.

### FLOATINE

Floatine Special Waterproofing Asphalt is supplied in drums containing approximately 400 lbs. nett.

(Continued on next page)





Brisbane City  
Town Hall.  
Architects:  
Messrs. T. R. Hall  
and G. G. Prentice.  
Builder:  
D. D. Carrick.

4,500 square yards  
of Flat Roofs  
covered with "A"  
Specification  
Malthoid.

## MALTHOID STANDARD WATERPROOFING SPECIFICATIONS

### For Waterproofing Flat Roofs

#### Specification "A."

- 1st layer—Genuine Malthoid Roofing One-ply
- 2nd layer—Flooded with Floatine (Special Asphalt)
- 3rd layer—Genuine Malthoid Roofing Two-ply
- 4th layer—Flooded with Floatine (Special Asphalt)
- 5th layer—Genuine Malthoid Roofing Three-ply
- 6th layer—Flooded with Floatine (Special Asphalt)
- 7th layer—Gravel Embedded in Floatine

#### Specification "B."

- 1st layer—Pabco Felt
- 2nd layer—Flooded with Floatine (Special Asphalt)
- 3rd layer—Pabco Felt
- 4th layer—Flooded with Floatine (Special Asphalt)
- 5th layer—Genuine Malthoid Three-ply
- 6th layer—Flooded with Floatine (Special Asphalt)
- 7th layer—Gravel Embedded in Floatine

#### Specification "C."

- 1st layer—Genuine Malthoid Two-ply
- 2nd layer—Flooded with Floatine (Special Asphalt)
- 3rd layer—Genuine Malthoid Extra Heavy (Five-ply)
- 4th layer—Flooded with Floatine (Special Asphalt)
- 5th layer—Gravel Embedded in Floatine

#### Specification "CX."

- 1st layer—Genuine Malthoid One-ply
- 2nd layer—Flooded with Floatine (Special Asphalt)
- 3rd layer—Genuine Malthoid Three-ply
- 4th layer—Flooded with Floatine (Special Asphalt)
- 5th layer—Gravel Embedded in Floatine

#### Specification "CY."

- 1st layer—Genuine Malthoid Two-ply
- 2nd layer—Flooded with Floatine (Special Asphalt)
- 3rd layer—Genuine Malthoid Three-ply
- 4th layer—Flooded with Floatine (Special Asphalt)
- 5th layer—Gravel Embedded in Floatine

### For Waterproofing Basements and Reservoirs

#### Specification "CZ."

- 1st layer—Flood Coat Floatine (Special Asphalt)
- 2nd layer—Genuine Malthoid Standard Dampcourse
- 3rd layer—Flood Coat Floatine (Special Asphalt)
- 4th layer—Genuine Malthoid Standard Dampcourse
- 5th layer—Flood Coat Floatine (Special Asphalt)

### For Waterproofing Sloping Roofs

#### Specification "D."

- 1st layer—Genuine Malthoid One-ply
- 2nd layer—Flooded with Floatine (Special Asphalt)
- 3rd layer—Genuine Malthoid Two-ply, painted red, green or black

#### Specification "E."

- 1st layer—Pabco Felt
- 2nd layer—Flooded with Floatine (Special Asphalt)
- 3rd layer—Genuine Malthoid Three-ply
- 4th layer—Flooded with Floatine (Special Asphalt)
- 5th layer—Gravel Embedded in Floatine

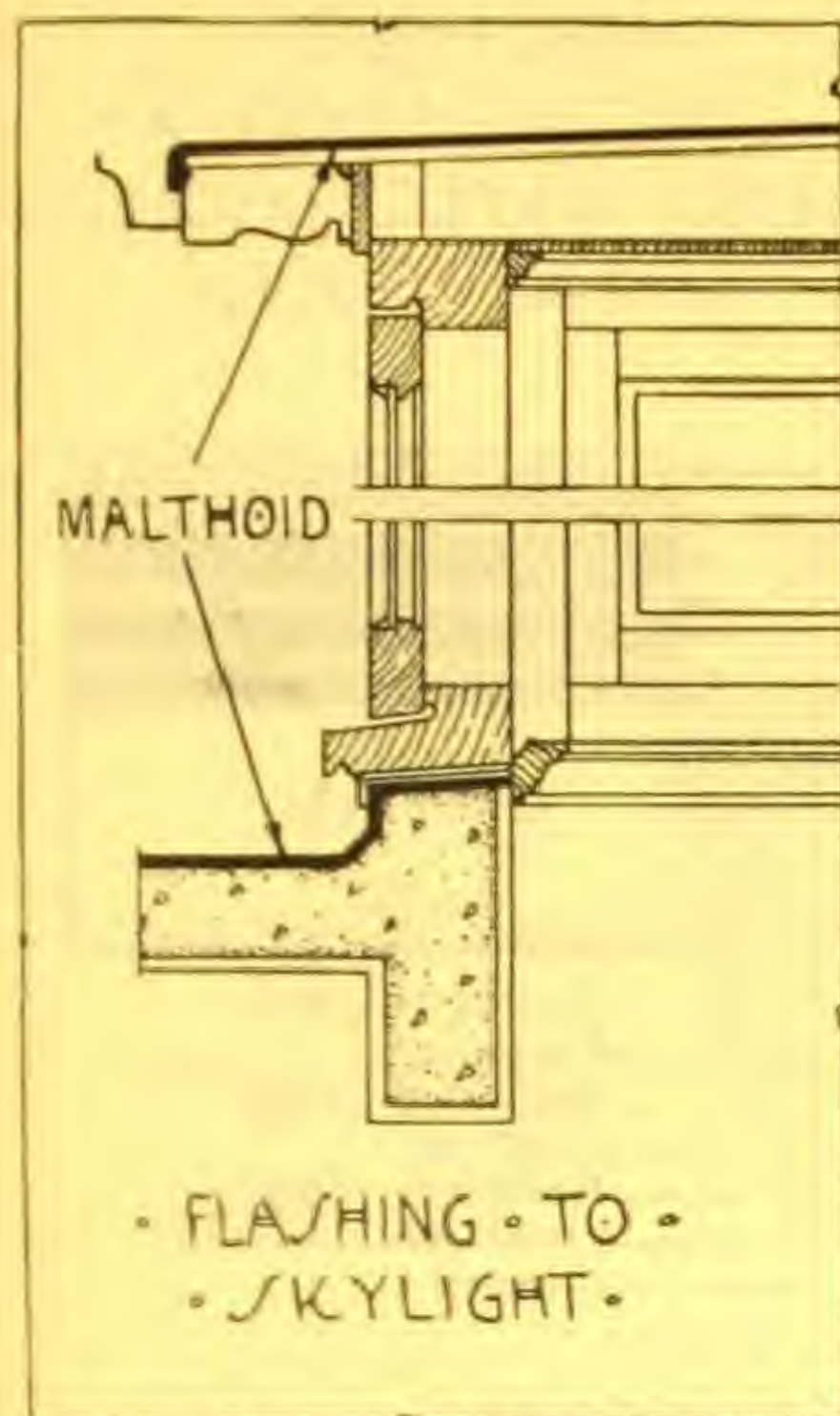
### For Waterproof Lining under Tiles

#### Specification "F."

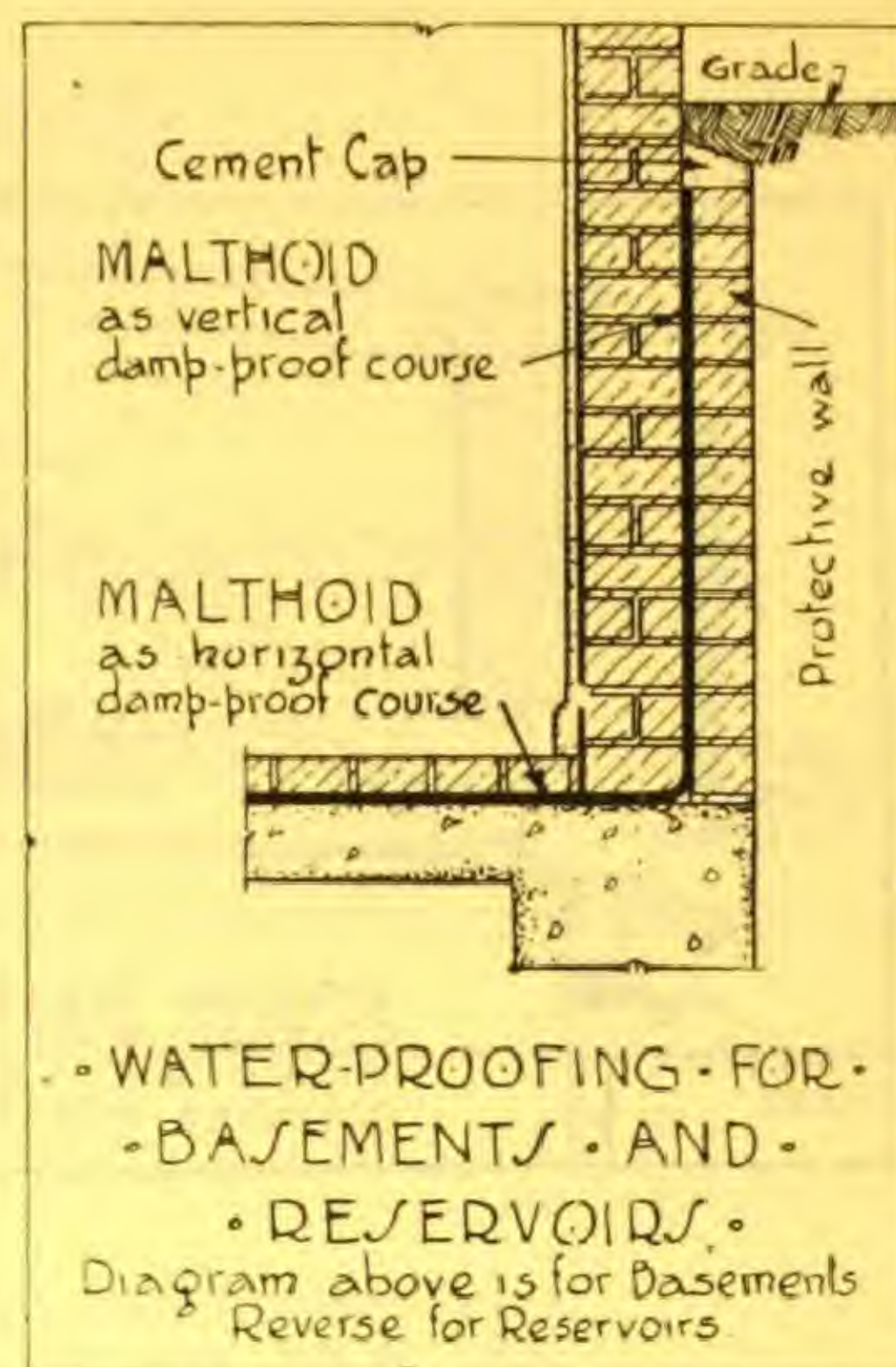
- Genuine Malthoid One-ply laid over rafters on which purlins and tile battens are affixed.

(Continued on next page)





THREE TYPICAL APPLICATIONS  
OF MALTHOID.



### Pabco Industrial Roofing White (Finley Type)

This material is similar to genuine Malthoid, but the side to be exposed to the weather is surfaced mechanically during manufacture with a mineral finish consisting of white porcelain granules. Pabco Industrial Roofing, porcelain finish, is manufactured in the following weights:—

Average 85 lbs. per roll—3 ft. wide and 36 ft. long, containing 108 sq. ft., or sufficient to cover 100 sq. ft. of roof area

Average 105 lbs. per roll—3 ft. wide and 36 ft. long, containing 108 sq. ft., or sufficient to cover 100 sq. ft. of roof area

Complete details regarding the adaption of this Roofing to particular industrial building conditions will be gladly furnished by us, particularly where the question of reduction of inside temperature is a decided feature or where the reflection of sunlight from roofs through windows, such as of a saw-tooth roof, is desired, in addition to long years of permanent waterproofing service. •

### Basement Waterproofing

Waterproofing Basements and Reservoirs usually requires special detailed specification to suit peculiarities usually found on every job such as varying water pressures, water levels, etc. The specification listed on the preceding page, Specification "CZ," will generally be found sufficient; but it is recommended to the profession that they call for the free service of one of the manufacturers' representatives to advise them should they have special difficulties to overcome in any of their basement or reservoir waterproofing.

Should a basement waterproofing fail it is quite often impossible to remedy it, or if a remedy is possible it is usually a most expensive one. For this reason the manufacturers of Malthoid respectfully suggest to the profession that they be given the opportunity of personally placing before the profession the benefit of their world-wide experience in this particular class of waterproofing.

### EXTRA HEAVY MALTHOID FLOOR COVERING

A sturdy floor covering to protect every type of floor.

Extra heavy Malthoid, equal in thickness to five-ply; wears much longer than linoleum on wood or concrete floors. At a cost surprisingly low you can replace frayed linoleum with this sturdy Malthoid fabric.

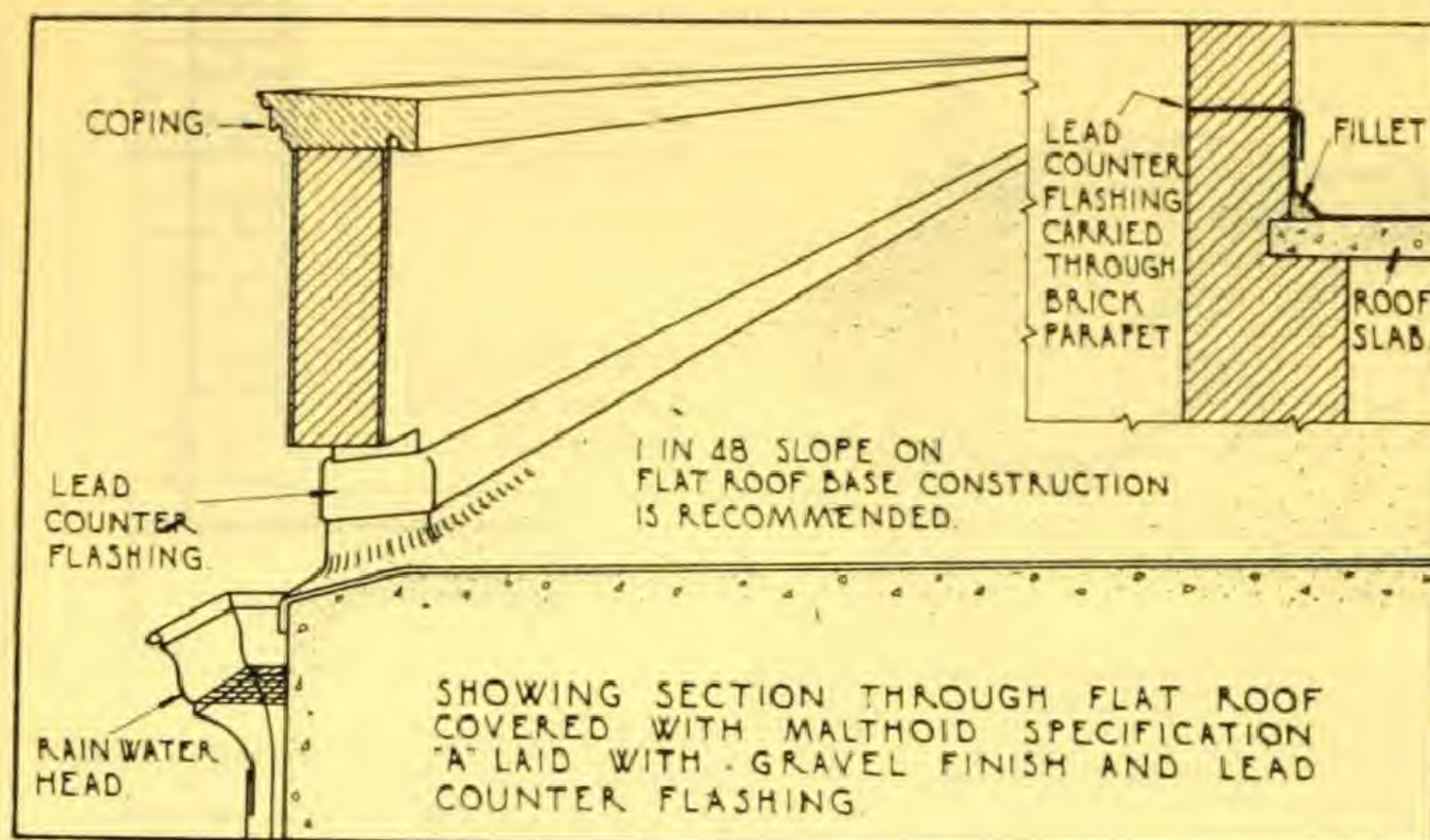
Government office, warehouse, merchant's office and public building floors in Australia and New Zealand have been covered with Malthoid since 1904, and there have been surprisingly few replacements.

Strips of Malthoid are three feet wide and 75 feet long. This great length is an advantage when laying the fabric in halls. When entirely covering a floor, fit the Malthoid with a slight gap between strips, just as linoleum is laid; this permits it to spread without subsequent wrinkling; or, better still, seal it to the floor with special asphaltic cement. The edges of Malthoid in contact under traffic fit so closely that the joints will gradually become invisible.

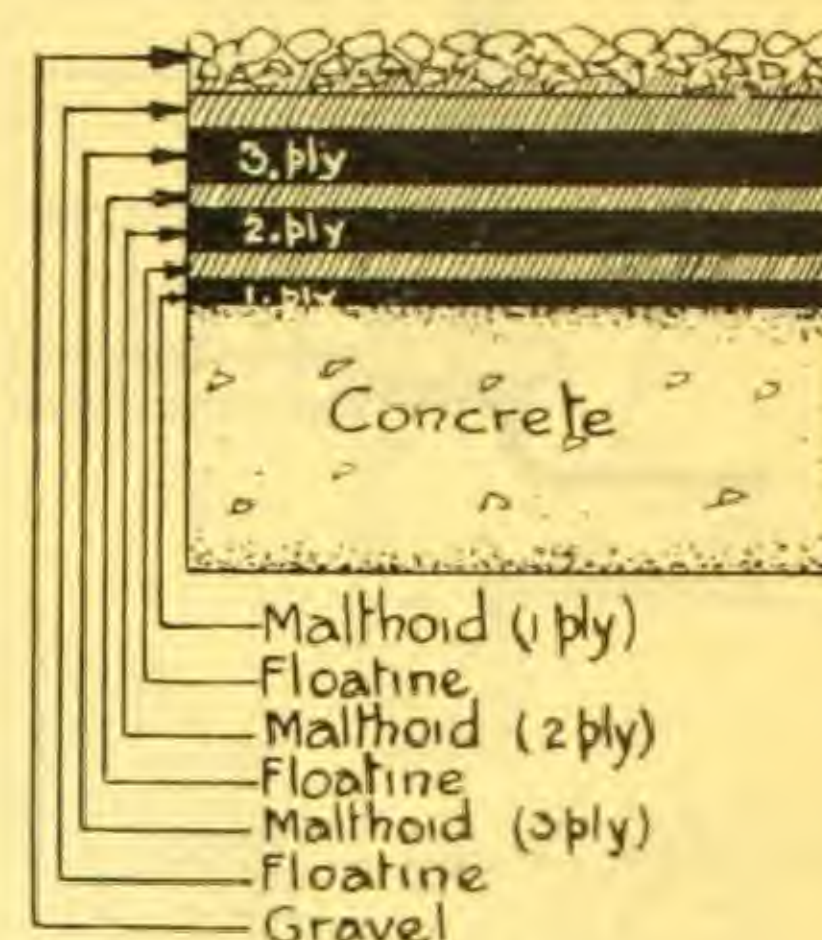
Rolls of Malthoid Floor Covering are strongly wrapped for despatch from ports to inland towns. The weight per roll of 225 square feet (25 square yards) is 145 pounds. Best results are attained when floor covering is laid over smooth boards or concrete without deep cracks.

(Continued on next page)





CROSS-SECTION OF  
MALTHOID  
SPECIFICATION "A"  
FOR WATERPROOFING  
FLAT ROOFS.



### ARCHITECT'S SPECIFICATION

#### FLAT ROOFING OVER BOARDS OR CONCRETE PREPARATION

**BOARD SURFACE.**—The roof boards shall be not less than 3-inch T. & G. well-seasoned Baltic, Oregon, Rimu, Kauri, or other similar flooring or lining boards—hardwood should not be used. The boarding shall be closely clamped, well nailed and all knot holes shall be covered with tin.

**CONCRETE SURFACE.**—The concrete surface shall be smooth, firm, dry, properly graded to outlets, free from all loose materials and swept clean by the General Contractor.

**ROOF METAL WORK AND COUNTERFLASHINGS.**—The General Contractor shall leave a suitable flashing groove in all parapet walls and other upright surfaces not higher than 12 inches and not less than six inches above the roof line at any point. All counterflashings, countersleeves, collars, sumps and outlets shall be lead or galvanized iron. On all metal pipes extending through the roof deck, countersleeves shall be used and shall extend down over the top of the collars. All these metal parts shall be properly connected to provide waterproof joints. All counterflashings shall extend into the flashing groove not less than one inch and down over the upturned roofing not less than four inches and shall be fastened firmly into the flashing groove with a galvanized flashing nail or metal wedge. All flashing grooves shall be pointed with a good cement mortar, after metal counterflashings have been installed.

**ROOF SLOPE.**—The specifications as outlined on page 78 hereof are suitable for inclines from one inch in 42 inches to one inch in six inches. Special specifications for steeper surfaces will be furnished upon request. Where incline exceeds one inch per foot, the roofing may be laid shingle fashion at right angles to the incline of the roof, lapping the sheets 19 inches and blind-nailing, sufficient to hold the roofing securely in place.

#### MATERIALS

Materials shall be Genuine Malthoid, Pabco No. 2 Asphalt Saturated Felt, Floatine and Pabco Fibre Roof Coating, Heavy, as required in accordance with specifications as detailed on page 78 hereof.

#### APPLICATION

**FIRST.**—On concrete roof decks the first layer of fabric shall be laid at right angles to the slope of the roof. It shall be spot-stuck with Floatine and overlapped two

inches at the seams. It shall be extended up parapet walls and other upright surfaces (excepting where sleeves are provided) to within three inches of the flashing groove. It shall be cemented solidly to the parapet walls or other upright surfaces from its top edge and extended to a point 12 inches on to the roof deck and for the full length of the flashings.

On timber roof decks proceed the same as for concrete, only substitute stagger nailing for the 12-inch solid cementing to the roof deck, using suitable large-head clout nails spaced at 4-inch centres.

**SECOND.**—All flashings shall be reinforced with a layer of 2-ply Genuine Malthoid Roofing, extending from a point two inches below the flashing groove to a point six inches on to the roof deck, cemented solidly to the underlying surface with Floatine. All valleys and low spots shall be reinforced in the same manner as the flashings with a layer of 2-ply Genuine Malthoid Roofing. All outlets and collars shall be set in position and either cemented with Floatine or nailed into place with suitable clout nails.

**THIRD.**—Spread a flood coat of Floatine, using not less than 30 lbs. per 100 sq. ft., over the entire surface of the first layer of fabric and embed the second layer of fabric simultaneously. The Floatine to be at a temperature of 350 degrees F. when applied and the second fabric run at right angles to the previous fabric, overlapping two inches at the edges and extending against upright surfaces to within one inch of the flashing groove.

**FOURTH.**—Proceed as in "Third" for each succeeding layer of Floatine and fabric until the required number of layers have been built up.

**FIFTH.**—Apply a flood coat of Floatine, using not less than 50 lbs. per 100 sq. ft., into which, while hot, embed sufficient gravel to completely cover the surface, the gravel to be clean, dry, and of a size that will pass through 1-inch mesh and be rejected by No. 6 mesh.

**SIXTH.**—After the metal counterflashings have been installed and the cement mortar pointing has thoroughly set and become dry, beginning at a point two inches above the lead or galvanized iron counterflashings and extending down to the roof line, the Roofing Contractor shall apply a heavy coating of Pabco Fibre Roof Coating, Heavy.



# JOHN LYSAGHT (AUST.) LTD.

SYDNEY · MELBOURNE · ADELAIDE

BRISBANE · FREMANTLE

Works: NEWCASTLE, N.S.W.

## ARCHITECTURAL DETAILS AND SPECIFICATIONS OF GALVANIZED SHEETS

### ORB GALVANIZED SHEETS

12c

S.A.A. File No.

### HISTORY

Lysaght's Newcastle Works were erected in 1920, the site chosen being one adjoining the B.H.P. Company's Steel Works, Newcastle, N.S.W. The raw material in the form of sheet bars for the production of both Black and Galvanized sheets is obtained from the latter Company,

Rolling operations commenced with two mills in April, 1921, and the plant was gradually extended until in May, 1928, eight mills were in operation. The whole of the plant is electrically operated. The plant includes modern annealing, pickling, and galvanizing units, together with the necessary equipment for flattening and corrugating. In 1930, eight more mills were laid down, together with the other equipment necessary to increase the possible annual production of Galvanized Sheets to 80,000 tons.

Lysaght's Newcastle Works have greatly benefited by the long experience of the parent British Company—John Lysaght Limited, of Bristol and Newport—the high quality and long-standing reputation of whose sheets, both Black and Galvanized, is preserved in the Australian production.

### QUALITIES AND BRANDS

LYSAGHT



AUSTRALIA

"ORB" Galvanized  
Corrugated  
The recognised standard  
quality for corrugated  
sheets throughout  
Australia.

LYSAGHT



TANKMAKING  
AUSTRALIA

"ORB" Tankmaking  
(Very Heavily Coated)  
The highest grade of  
Tankmaking sheets  
available. Strongly  
recommended for use  
under exacting climatic  
conditions or where  
the water possesses  
mineral properties  
detrimental to the life  
of ordinary sheets.

"GUINEA"



AUSTRALIA

"GUINEA" Galvanized  
Corrugated

A good quality sheet,  
second only to "ORB"  
in quality. Recom-  
mended for use where  
price is a consideration.

LYSAGHT



"QUEEN'S HEAD"  
AUSTRALIA

"QUEEN'S HEAD"  
Galvanized Plain  
The recognised standard  
quality for Plain Gal-  
vanized Sheets through-  
out Australia.

LYSAGHT



AUSTRALIA  
"FLEUR-DE-LIS"

Galvanized Plain  
A good quality sheet,  
used extensively for  
the lighter class of  
sheet metal work where  
price is a consideration.



### Manufacture

The whole of the raw material used in the manufacture of Lysaght's Australian-made sheets, both Black and Galvanized, is produced in Australia. The steel from which the sheets are rolled is received in multiple bars from the Broken Hill Pty. Co. Ltd.'s Steel Works, Newcastle. These bars are cut into lengths and heated in furnaces, then rolled into sheets (the illustration on page 2 shows this process). The sheets are next sheared to the required size, cold rolled and annealed.

Sheets intended for galvanizing are then pickled in an Automatic Pickling Machine, from which they pass direct into the Galvanizing Department. Here the sheets are passed through a bath of molten Spelter, and it is on the protection of this coating of Spelter that the life of the galvanized sheet depends. Lysaght's "ORB" and "QUEEN'S HEAD" brands hold the premier position for perfection of galvanized sheets, and these brands are guaranteed by the manufacturers.

A most complete system of inspection is adopted right throughout the works; after each operation the sheets are examined, and, if defective in any way, they are rejected.

The result is a finished sheet equal to that produced in any part of the world.

Space does not permit a more detailed description of the most interesting and intricate processes, but special facilities are afforded to architects, engineers, and students, etc., to inspect the Works, and permits may be obtained on application to John Lysaght (Australia) Limited, Endeavour House, Macquarie Place, Sydney.



Steel Sheet Rolling Mill.

### What Type of Construction for Industrial Buildings

The modern industrial building must have elasticity. The chief consideration in constructing such a building is to house the plant so that it may yield the maximum of efficiency. The space necessary to house the present plant may be easily determined, but it is impossible to forecast whether more or less area will be needed in the future. It may be necessary to install a number of larger machines occupying more space, or, on the other hand, a device might be invented to perform the work of several large machines, and which would fill only, say, 25 per cent. of the space. In that event, a large area of space is left which becomes so much waste. To overcome this difficulty, the building material must be one that makes possible extension or re-construction on any scale, a flexible product, always capable of re-adjustment for every requirement. For this purpose, "ORB" galvanized corrugated sheets are ideal. Obviously, buildings constructed of this material may be extended or diminished in size as required, quickly and economically. A galvanized sheet industrial building may be said to be portable as well as permanent.



Exterior View of Lysaght's Newcastle Works.  
A typical modern example of steel fabrication with "ORB" Galvanized Corrugated Roofing and Siding.

### Life of Galvanized Sheets

The life of a galvanized sheet depends upon the uniformity of its zinc coating; the smallest ungalvanized spot weakens the whole sheet. So far as durability is concerned, the base of the galvanized sheet is immaterial; pure iron, charcoal iron or steel will all perish quickly when the coating is destroyed.

"ORB" and "QUEEN'S HEAD" brands are the most perfect and heavily coated sheets manufactured, and will, therefore, outlast any other make.

### Advantages of "Orb" Galvanized Corrugated Sheets

Adaptable to many kinds of construction and types of buildings.

Ease of application — unskilled labour may be employed.

Fire retardent.

Slow depreciation—satisfactory service.

Develops maximum strength through the distinctive corrugations.

Watertight construction on any angle guaranteed by use of ample side and end laps.

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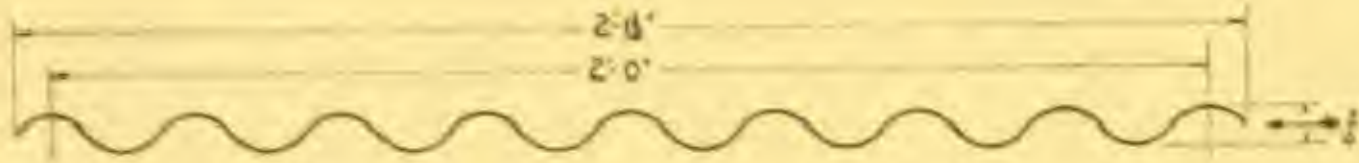


## ORB GALVANIZED SHEETS

## CORRUGATED GALVANIZED SHEETS

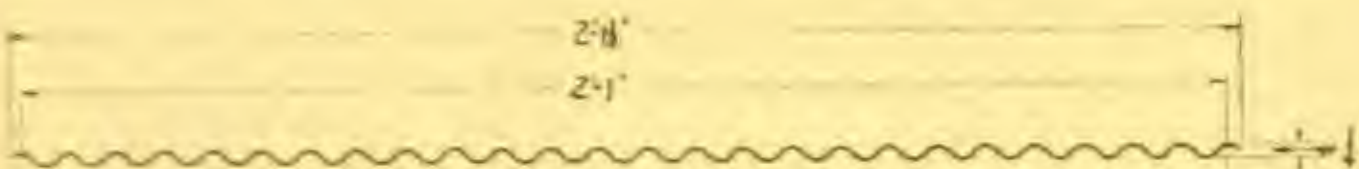
## Description

The "ORB" standard galvanized sheets, which are so extensively used for all types of industrial and domestic structures because of their durability and resistance to corrosion, are manufactured in any gauge from 16 to 26, and in standard widths of eight 3-in. corrugations of 3-in. pitch, as shown in the diagram.



## "Orb" 1in. Corrugated Sheet

The "ORB" standard 1-in. corrugated sheets generally of 24g., 26g., or 28g., are used for ceilings, linings, bath screens, awning panels, fences, etc., and have the following section:



## Covering Capacity

The gauge of sheets usually used for roofing and siding are 22, 24, or 26. 24-gauge "ORB" is recommended for general use, and 22-gauge where corrosive conditions are bad.

One ton of corrugated sheets has the following approximate covering capacity:—

	24 G. 3 in. Cor.	26 G. 3 in. Cor.	28 G. 3 in. Cor.	28 G. 1 in. Cor.
Single Lap	1,600 sq. ft.	2,200 sq. ft.	2,327 sq. ft.	2,645 sq. ft.
Lap and half	1,500 "	2,000 "	—	—
Double Lap	1,400 "	1,900 "	2,230 "	2,535 "

One packet (100) spring head nails are usually allowed to the square.

## Available Sizes

The table shows the list of available sizes and gauges, and approximate number of standard 3-in. corrugated sheets to a case weighing about 10 cwt.:—

Length.	Gauges.						
	16	18	20	22	24	26	28
5 feet	33	42	53	66	83	118	132
6 feet	27	35	44	55	69	98	111
7 feet	23	30	38	47	59	84	95
8 feet	20	26	33	41	51	73	83
9 feet	18	23	29	36	45	65	74
10 feet	16	21	26	33	41	58	66
11 feet	15	19	24	30	38	54	—
12 feet	14	17	22	28	35	49	—

## Weights per Sheet

Approximate weight per sheet in lbs. (based on above table to nearest 1 lb.).

Gauge	5 ft.	6 ft.	7 ft.	8 ft.	9 ft.	10 ft.	11 ft.	12 ft.
16	34	40½	48	54½	62	68	74½	81 lbs.
18	26½	32	37½	43	49	53	58½	64 "
20	21	25½	29½	34	38½	43	46½	51 "
22	17	20½	24	27½	31	34	37½	40½ "
24	13½	16½	19	22	25	27½	29½	32½ "
26	9½	11½	13½	15½	17½	19½	20½	23 "
28*	8½	10	11½	13½	15½	17	—	—

\*1-in. corrugated sheets only.

## GALVANIZED PLAIN SHEETS

## "Queen's Head" Sheets

Lysaght's "QUEEN'S HEAD" plain galvanized sheets are recognised throughout Australia as being unequalled when sheets possessing the qualities of perfect galvanizing and exceptional finish are desired. They can be used with the greatest of confidence for all classes of galvanized linings and flat roof construction where even the slightest degree of corrosion is to be avoided.

In addition to this very important use, reputable firms of sheet metal workers use nothing else but

"QUEEN'S HEAD" sheets for the manufacture of spouting, ridging, valleys, downpipes, rainwater heads, vent ducts, sheep troughing, baths, tank tops and bottoms, etc.

## "Fleur-de-lis" Sheets

These sheets are largely used for the manufacture of lighter classes of guttering, downpiping, ridging, etc., its smoothness of surface and freedom from buckling being conspicuous features.

## DETAILS OF THE STANDARD 6 FT. AND 8 FT. "QUEEN'S HEAD" SHEETS

## 6 feet Sheets

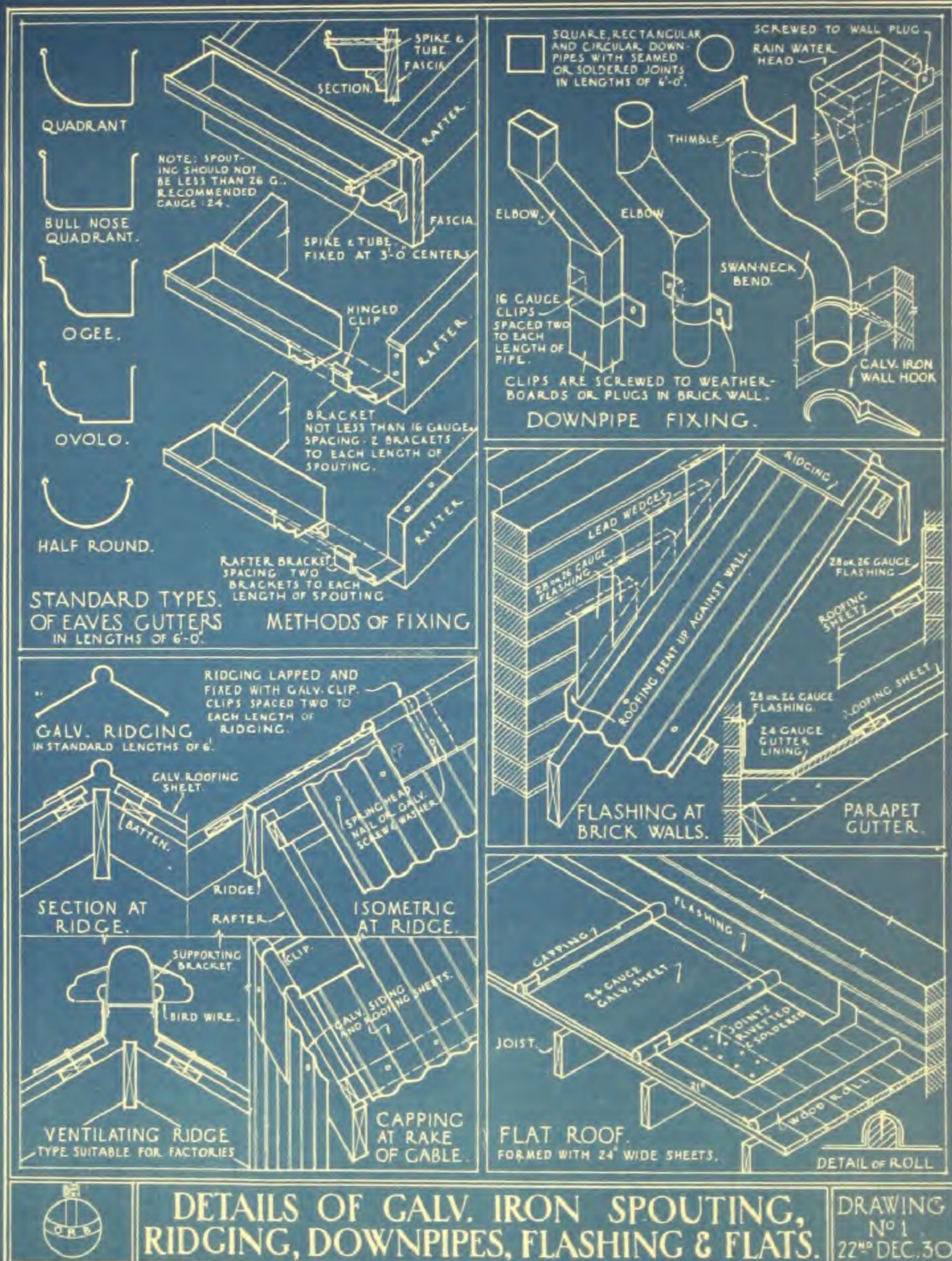
Approximate number of 6 ft. sheets to a case of Plain Iron averaging about 10 cwt.					Approximate weight per sheet 6 ft. long, in lbs., based on foregoing list.				
Gauge	Width				Gauge	Width			
	24in.	30in.	36in.	48in.		24in.	30in.	36in.	48in.
14	30	23	19	—	14	27	48½	59	—
16	36	29	24	17	16	31	38½	46½	64
18	47	37	31	23	18	24	30½	36	48
20	57	45	38	28	20	19½	25	29½	40
22	74	59	49	37	22	15	19	23	30
24	86	69	57	43	24	13	16½	19½	26
26	120	97	80	—	26	9½	11½	14	—
28	140	112	92	—	28	8	10	12½	—
30	160	130	112	—	30	7	8½	10	—

## 8 feet Sheets

Approximate number of 8 ft. sheets to a case of Plain Iron averaging about 10 cwt.					Approximate weight per sheet 8 ft. long, in lbs., based on foregoing list.				
Gauge	Width				Gauge	Width			
	24in.	30in.	36in.	48in.		24in.	30in.	36in.	48in.
16	26	21	17	13	16	41	52	62½	82
18	35	28	23	14	18	32	40	48	64
20	43	34	28	21	20	26	33	39	53
22	55	44	37	28	22	20	25	31½	40
24	65	52	43	32	24	17	21½	26	34½
26	91	73	61	—	26	12	15	19	—
28	103	82	68	—	28	11	13	16	—
30	120	97	84	—	30	9½	12	13½	—

(Continued on next page)







## ORB GALVANIZED SHEETS

## GALVANIZED SHEET METAL FITTINGS

## Spouting (or Eaves Gutters)

The most usual types of spouting are illustrated on Drawing No. 1, the stock sizes being 3, 3½, 4, 4½, 5, 6 ins. wide, in 6 ft. and 8 ft. lengths. Nothing less than 26-gauge sheets should be used, and for first-class work, 24-gauge "QUEEN'S HEAD" is recommended, particularly when exposed to seaside atmospheres.

Fixing is provided by means of galvanized spikes and tubes or 1½-in. wide galvanized brackets (not less than 16-gauge) spaced at intervals of approximately 3 ft. These brackets are made in two types; one is fitted with a light strap, which clips over the bead of the spouting, as shown in Drawing No. 1, and the other is a plain bracket, which secures the spouting at the front, underneath the bead, with 7/32 x ½ in. galvanized bolts.

Spouting should be set at a slight fall (say ½ in. in 10 ft.) towards downpipes, and all joints should be lapped in the direction of the water flow, double riveted, and soldered.

## Ridging and Hips

Galvanized ridges and hips formed from "QUEEN'S HEAD" sheets are available in stock sizes of 12, 14, 15, 16, 18, 20, 24 ins. (these measurements represent width of sheet from which ridging is formed), in 6 ft. and 8 ft. lengths of 26 and 24 gauge. The architect is recommended to specify 24-gauge.

Joints are either over-lapped at least 6 in. and secured in connection with roofing sheets, or lapped 2 or 3 in. and secured with 1½-in. wide 16-gauge clips, which are fixed to battens with spring-headed roofing nails or galvanized screws and washers.

"QUEEN'S HEAD" sheets are greatly used by sheet-metal workers in the formation of ventilating ridges suitable for all types of public and industrial buildings. A type suitable for the latter building is shown, the ventilating area varying according to the requirements of the individual job. Ventilating ridges are in 6 ft. and 8 ft. lengths, and when placed in position the ends are over-lapped, or butted and strapped with 16-gauge saddle clips, which follow the contour of the ridging and are secured in turn to the battens as above.

## Gutter Lining

Lead as a gutter-lining material is most unsuitable in Australia, where the extremes of temperature subject it to excessive expansion and contraction, resulting in "creeping" and cracking. "QUEEN'S HEAD" galvanized sheets of 22 or 24 gauge, not being subject to these defects, are ideally suited for all types of parapet, box and valley gutters.

The sheets should be carefully bent to shape, double-riveted and soldered at laps, and left as free

as possible, avoiding the use of nails. All laps must be made in the direction of the water flow.

The recommended fall for box and parapet guttering is 1½ in. to every 12 ft.

## Down Pipes

Circular downpipes made from "QUEEN'S HEAD" sheets are stocked in diameters of 1½, 2, 2½, 3, 3½, and 4 ins., and rectangular sections in sizes of 3 x 2 in., 4 x 3 in., 4 x 4 in., and 6 x 4 in. They are of 24 and 26 gauge and in 6 ft. and 8 ft. lengths, with seamed joints.

Downpipes are connected to spouting with tapered galvanized thimbles fitted to the bottom of spouting. Thimbles are slightly flanged at their tops in order to make a neat soldered connection at this point.

Offsets and elbows to complete the various lengths of downpiping and to set around projections are available. The usual connection to eaves gutter is made by straight elbows; special swan-neck bends are used in better-class work.

Downpipes are secured to walls with 16-gauge galvanized straps, which are screwed directly to weatherboards or plugs in brick walls. An alternative method for securing pipes to brick walls is in the use of galvanized wrought-iron wall hooks, which are driven into plugs inserted in the joints of brickwork.

## Flashing

For general flashing purposes, "QUEEN'S HEAD" galvanized sheets are highly satisfactory, and, according to the nature of the job, 24, 26, or 28 gauges may be used.

The drawing shows the flashing at the intersection of a roof and brick wall. The galvanized roofing sheets should be bent up against the wall for at least a height of 2 in., and then over-flashed with 24, 26, or 28 gauge stepped cover pieces built in to the brickwork joints about 1½ in., and secured with lead wedges. All flashings should have a vertical height of at least 6 in.

## Galvanized Flats

In the formation of flats it is advisable to use the smaller width sheets, and to place them in position as free as possible, in order to accommodate any slight expansion or contraction.

The detail of Drawing No. 1 shows the construction of a typical flat formed with 6 ft. x 24 in., 24-gauge "QUEEN'S HEAD" sheets. The T. & G. decking is constructed with a slight fall, and wood rolls spaced as shown. The sheets are placed in position, turned up against the wall and at sides of rolls, and are lapped, double-riveted, and soldered at joints.

The rolls and upstanding edges of sheets are covered with galvanized capping, which is bent over so as to clinch sheets in position, and is then secured at top with galvanized screws and washers.

## Proportioning Gutters and Downpipes to the Roof Surface

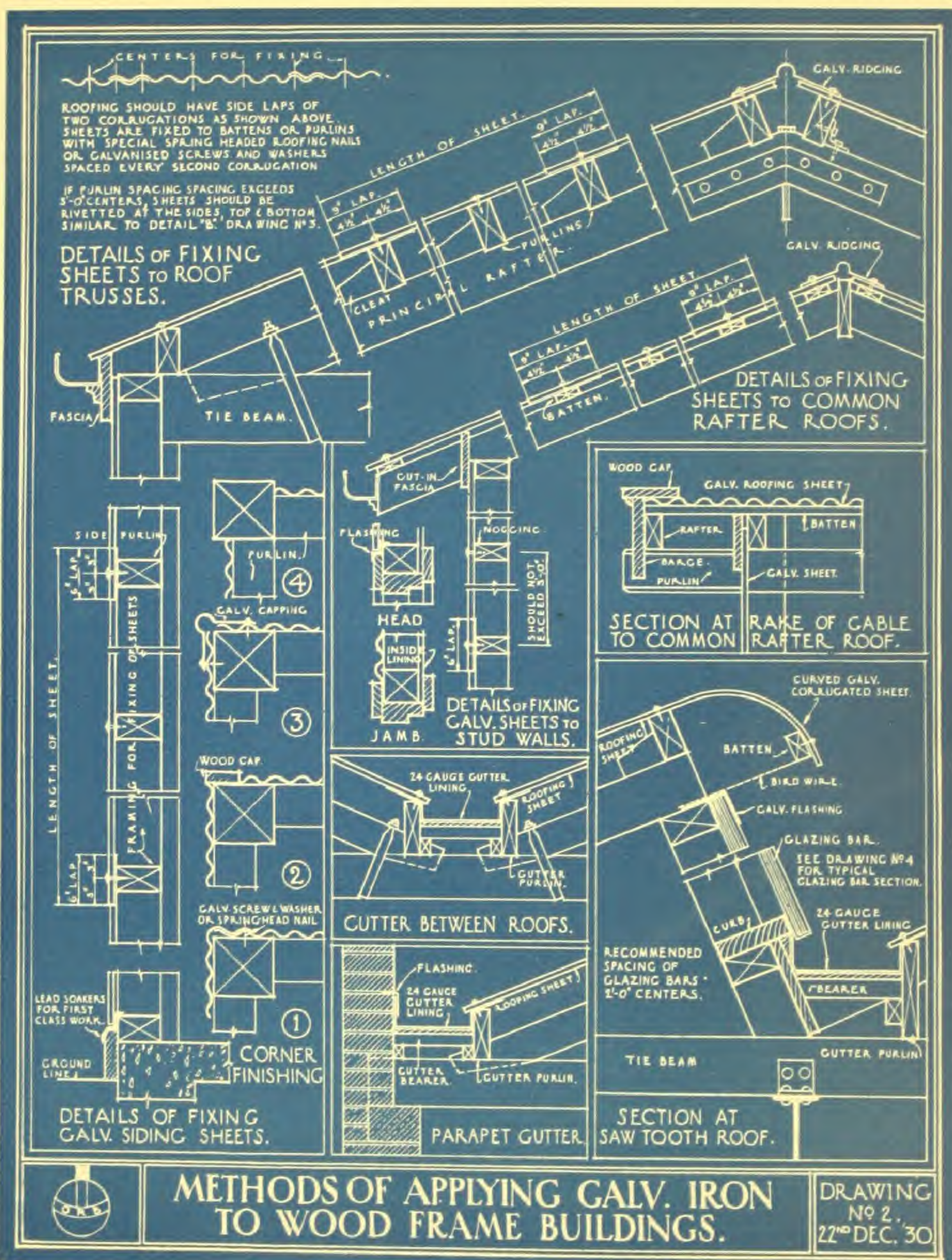
The size of gutters and downpipes and their distance apart for roofs of industrial buildings with a ¼ pitch may be determined from the following table:—

One-half roof-span in feet	10	20	30	40	50
Size of gutter in inches	5	5	6	6	7
Diameter of downpipe in ins.	3	3	4	4	5
Spacing of downpipe in feet	50	50	50	50	40

Another method used is to allow 1 square inch of downpipe area for each 75 square ft. of roof surface drained.

(Continued on next page)







## ORB GALVANIZED SHEETS

### CORRUGATED GALVANIZED SHEETS

#### Application to Wood Frame Buildings

##### Roofing

"ORB" standard corrugated sheets are applied directly to battens or purlins, and fixed by means of galvanized screws and washers or special spring-headed roofing nails pierced through the top of each alternate corrugation, the size of nails or screws varying from 2 to 3 in. Sheets should be laid with a side lap of 2 corrugations and end lap of 9 ins.

Each sheet should be secured, as described, at the top, bottom, and across centre, the spacing of purlins or battens not exceeding 3 ft. centres if sheets are to be left unriveted. If purlins exceed 3 ft. centres, it is recommended that sheet be riveted similar to those applied to steel frame structures as described on page 8, and illustrated on Drawing No. 3. The recommended spacing of wood purlins is 2 ft. 6 in. to 3 ft. centres.

##### Wall Siding

Corrugated sheets, as wall siding, are applied in a similar manner to the roofing sheets. Sheets may be lapped  $1\frac{1}{2}$  or 2 corrugations at the side, but not less than 6 in. at the ends. The side purlins of wall framing, or nogging, of ordinary stud walls should not exceed 3 ft. centres when designed according to best practice.

Corners of buildings may be finished by any of the methods shown on the drawing. The finish at No. 3 is to be preferred, as the galvanized capping provides a complete watertight job.

##### Ridging, Flashing, Gutter Linings, etc.

Examples of this work are shown on Drawing No. 2. Typical details of finish at eaves and gables are also given.

Details of the application of galvanized sheets to a saw-tooth roof are shown. The curving of the sheets at the top of the saw-tooth is formed in the sheet-metal shop in accordance with architect's details. The finish at the head provides excellent ventilation; bird-wire should always be fixed as indicated, to prevent the ingress of birds.

### APPLICATION TO STEEL FRAME BUILDINGS

#### Roofing and Siding

The sheets should be applied with similar side and end laps as recommended for wood-frame buildings. They may be secured to wood purlins used in conjunction with steel framing, in which case fixing would be provided as before. If framing is of all-steel construction, the sheets are usually secured to steel purlins with hook bolts.

Hook bolts, as the name suggests, are galvanized bolts threaded one end and hooked at the other. Holes are punched in the sheet at desired points of fixing, and the bolts passed through them and hooked over the purlin, and the sheets firmly drawn down and tightened by the nut at the threaded end. A lead and a galvanized washer are placed between the nut and the galvanized sheet. The lead washer is placed next to the sheet, and the galvanized washer fits it so as to form a protection from the pressure of the nut.

The length of the bolt varies in accordance with the size of purlins; the diameter is generally  $\frac{1}{2}$  in.

#### Application of Sheet Metal Fittings

The eaves treatment shown on the drawing provides a substantial and lasting finish, but where economy is desired, an effective fixing is gained by simply supporting the spouting by means of galvanized brackets (similar to those described on page 4), which are in turn attached to the underside of corrugated roofing sheets and secured with two sheet bolts spaced about 3 in. apart. This fixing is similar to that shown at the right-hand lower corner of the drawing, where the method is used in connection with the eaves formed at a brick wall.

Sheet bolts (galvanized) are dome-headed, and fitted with galvanized nut and washer. The usual sizes are  $\frac{1}{2}$  in. x  $\frac{7}{32}$  in.,  $\frac{3}{4}$  in. x  $\frac{1}{2}$  in.,  $\frac{3}{4}$  in. x  $\frac{9}{32}$  in. When used as above the head is at the underside of sheet, and the nut and washer finishes on top of the corrugation.

Other uses of these bolts are made when attaching downpipe clips to galvanized siding sheets, and at ridging clips where no wood purlins or battens are provided for fixing. Detail "A" shows their application for corner finishing.

#### Internal Gutters

Drawing No. 3 shows a typical method of installing a galvanized sheet gutter between two roofs. The gutter lining should not be less than 24 gauge—22 or heavier is recommended—with end laps double riveted and soldered. The lining is supported by  $1\frac{1}{2}$  x  $\frac{1}{2}$  in. galvanized hoop-iron brackets, spaced at 3 ft. centres, and bent over steel purlins or securely screwed to wood purlins as shown.

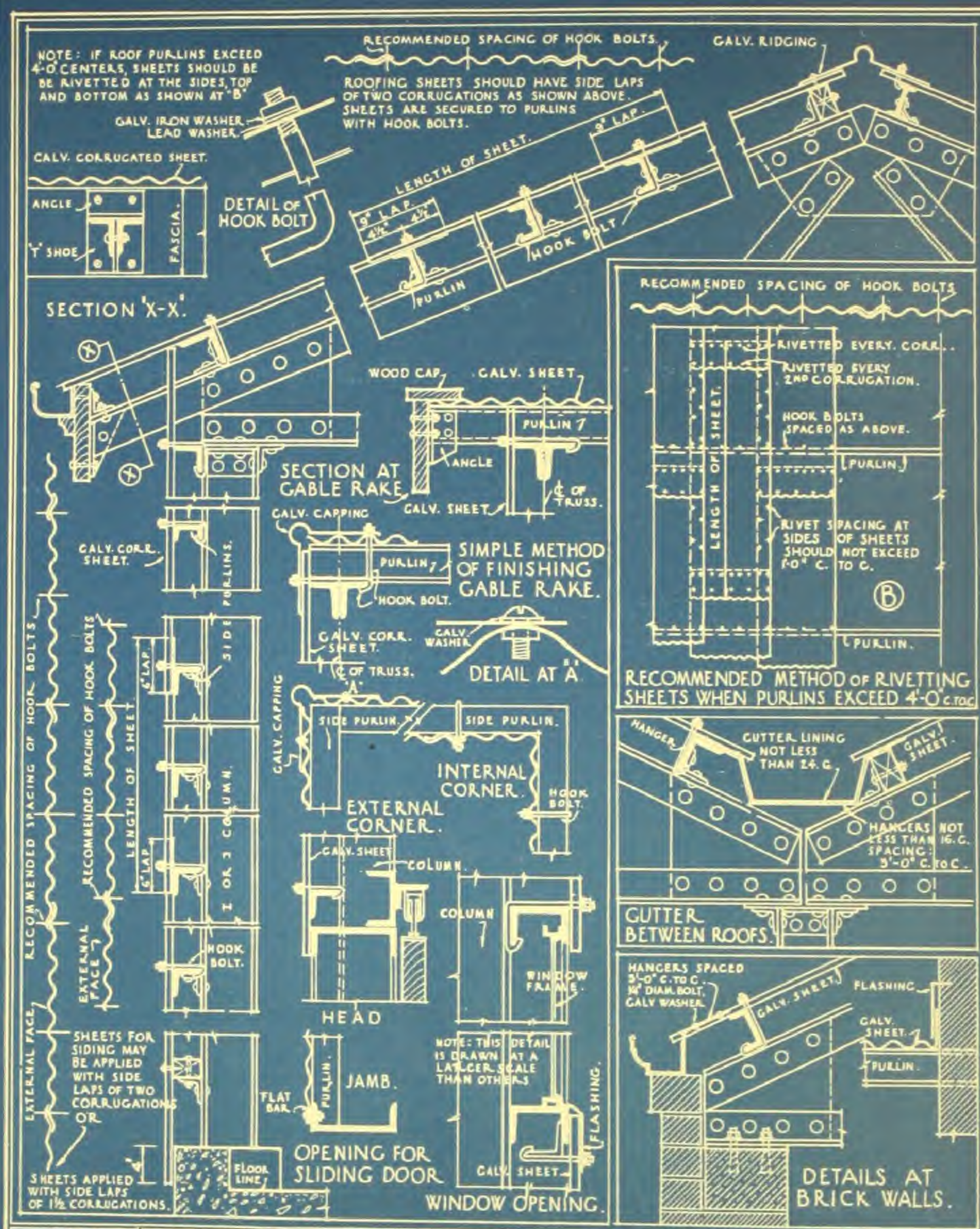
#### Purlin Spacing

Spacing of purlins should not exceed 4 ft. centres, excepting when it is the intention to rivet together the galvanized sheets at the sides, top and bottom, as recommended at Detail "B." Care should be exercised by riveters so as to avoid punching holes too large or breaking the galvanized coating. It is of great importance that rivets be placed at the top of the corrugations at the points of fixing. The size rivets generally used for such riveting is  $\frac{3}{8}$  x  $\frac{3}{16}$  in., or  $\frac{1}{2}$  x  $\frac{1}{4}$  in.

(Continued on next page)



## ORB GALVANIZED SHEETS





# ORB GALVANIZED SHEETS

## ARCHITECT'S SPECIFICATION

### MATERIALS

#### GENERAL

All galvanized materials noted in this specification shall be as manufactured by Lysaght's Newcastle Works Ltd. Galvanized sheets shall be of specified gauge with manufacturer's brand indicated on each sheet. All hangers, screws, nails, etc., shall be galvanized.

#### GALVANIZED CORRUGATED SHEETS

Shall be standard 3 in. corrugated Australian "ORB"

#### GALVANIZED LINING SHEETS

All specified internal galvanized lining sheets shall be standard 1 in. corrugated Australian "ORB" brand.

#### SHEET METAL

All sheet metal used in the formation of flat roofs and in the manufacture of spouting, downpipes, ridging, gutter linings, flashing, skylights and ventilators shall be of (a) Australian "QUEEN'S HEAD," or (b) Australian "FLEUR-DE-LIS" brand, galvanized tinned special flat sheets.

#### SOLDER

Where specified to be used, solder shall be of best grade and consist of even parts of tin and lead.

### WORKMANSHIP

#### GENERAL

The application of corrugated sheets and sheet metal fittings shall be in strict accordance with the following specifications. When details are provided, construction shall be as indicated on drawings.

Care shall be exercised to avoid breaking galvanized coating when forming and applying sheets. The same care shall be necessary when securing sheets with screws, bolts, nails and rivets. Sufficient solder shall be used at laps to provide complete waterproof joints.

#### SPOUTING (OR EAVES GUTTERS)

Spouting shall be ..... in. 24 gauge ..... type in 6 ft. or 8 ft. lengths.

Spouting shall be (a) secured to rafters with 16 gauge galvanized brackets screwed with a pair of screws to each alternate rafter, or at intervals of approximately 3 ft.; (b) secured to fascia boards with galvanized spike and distance tubes spaced on 3 ft. centres; (c) fastened to corrugated roofing sheets with 16-gauge brackets secured to sheets at intervals of 3 ft. with a pair of ..... in. galvanized bolts, nuts and washers at each point of fixing.

Spouting sections shall be double riveted and soldered at laps. Cut holes in spouting for receiving thimble connection of downpipes and properly solder at these junctions.

#### DOWNPIPES

Downpipes shall be (a) 24 gauge ..... in. diameter; (b) 24 gauge x ..... in. rectangular sections in lengths of 6 ft. or 8 ft.

Downpipes shall be secured (a) to weatherboards with 16-gauge galvanized straps screwed to wall; (b) to brickwork joints with galvanized wrought iron wall hooks; (c) to corrugated wall siding sheets with 14 gauge galvanized straps bolted to sheets with a pair of ..... in. galvanized bolts and washers. Spacing of same to be two to every length of pipe.

Downpipes shall be connected to thimble connections with swan necks (or straight elbows) and at the foot to stone pipe drains with rounded shoe pieces through cemented joints.

#### GUTTER LININGS

Linings of parapet, box and chimney gutters shall consist of (a) 22 gauge; (b) 24 gauge galvanized sheets, carefully bent to shape and laid on (a) wood line gutters constructed to detail; (b) in  $\frac{1}{2} \times \frac{1}{2}$  in. galvanized hoop iron hangers spaced at 3 ft. centres and bolted to corrugated roofing sheets with a pair of ..... in. galvanized bolts (provided with galvanized washers) at each point of fixing. Lining shall extend up pitch of roof for a minimum distance of 8 in. or to a point at least 5 vertical

inches above front edge of gutter. All laps at ends of sheets shall be 4 in. and doubled riveted and soldered. Provide a continuous fall of  $1\frac{1}{2}$  in. in every 12 ft. towards drainage outlets.

#### VALLEY GUTTERS

Valley Gutters shall consist of (a) 22 gauge; (b) 24 gauge ..... in. wide galvanized sheets in 6 ft. or 8 ft. lengths, carefully bent to shape and laid with 4 in. end laps double riveted and soldered.

#### FLASHINGS

All flashings shall consist of (a) 26 gauge; (b) 28 gauge galvanized sheets.

Flashings at intersections of brick walls and corrugated roofing sheets shall be properly (a) cut and stepped; (b) aproned two courses above intersection and extended at least 4 in. out on to roofing, and secured in brickwork joints with lead wedges and afterwards pointed up in cement.

Note.—Specify flashings at parapet gutters of brick walls similar to the above apron flashing (b), omitting the portion specifying flashing to be carried out on roof.

The heads and sills of door and window openings in corrugated sheet walls, and the sills of dormers in galvanized roofs should be flashed with gauge metal previously specified.

#### RIDGING

Ridging shall be (a) 22 gauge; (b) 24 gauge sheet metal formed from ..... in. wide sheets of 6 ft. or 8 ft. lengths. Ridging shall be applied where shown on drawings, lapped (a) at least 6 in. at end joints and securely fixed in position in conjunction with roofing sheets; (b) at end joints and secured with 16-gauge clips spaced two to each length of ridging, and fixed to battens or purlins with (a) special spring-headed roofing nails; (b) galvanized screws and washers.

#### VENTILATING RIDGES

Provide No. .... 6 ft. or 8 ft. lengths of ..... brand ..... in. ventilating ridges. Ridges shall be laid with (a) 6 in. over-lapped joints; (b) butt joints covered with 16-gauge saddle clips; secured to woodwork with (a) special spring-headed roofing nails; (b) galvanized screws and washers.

#### HIPS

Specify similar to "Ridging."

#### FLAT ROOF

All wood decking shall be laid solid and nails driven flush and surfaces swept clean as a preparation for receiving sheet metal. Wood rolls shall then be nailed to decking, with intervals of 21 in. between their sides. Cover all panels so formed with 24 gauge 24 in. wide galvanized flat sheets with edges carefully bent up  $1\frac{1}{2}$  in. at sides of rolls and 3 in. at intersection of deck and wall. All laps at ends of sheets shall be 4 in. and double riveted and soldered.

Cover rolls and upstanding edges of sheets with 24 gauge galvanized capping bent over to clinch sheets at sides and secured on top with galvanized screws and washers spaced not more than 2 ft. centres.

Flash at intersection of walls and roof as specified under "Flashing."

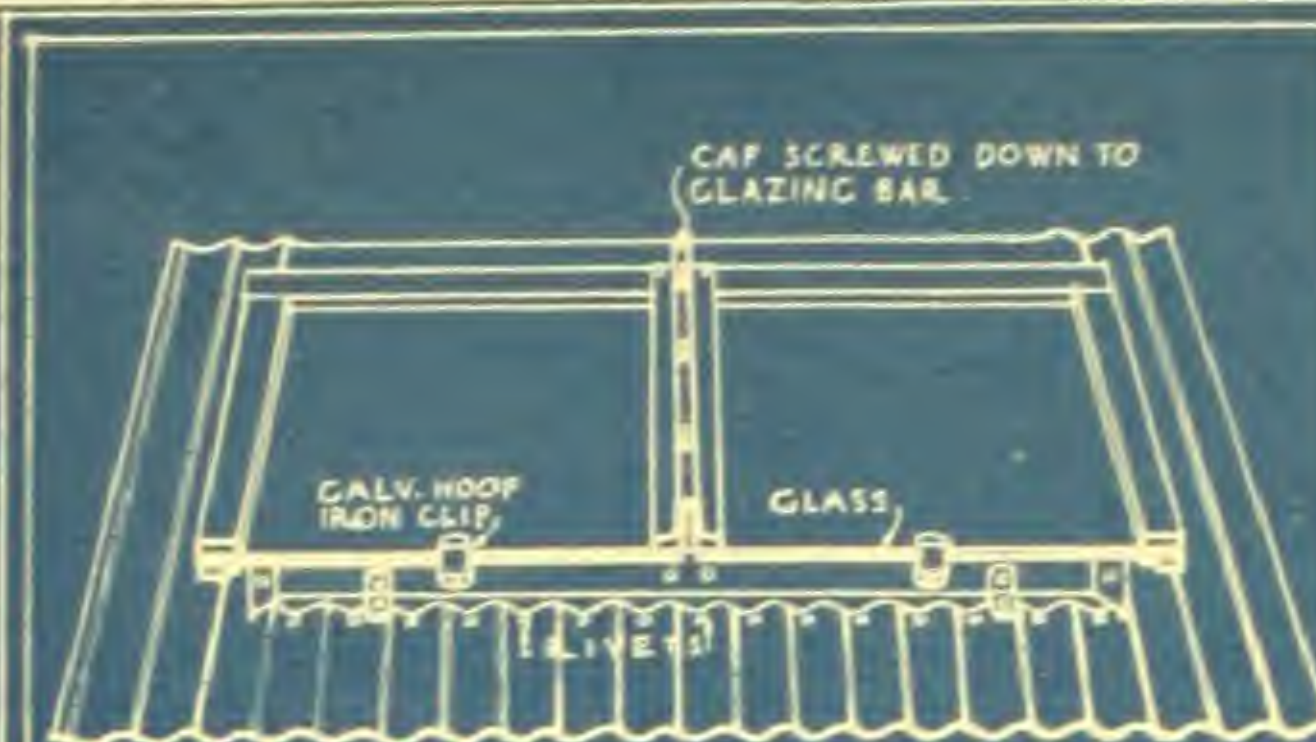
#### CORRUGATED ROOFING SHEETS

All pitched roofs shall be covered with .... ft. 24 gauge corrugated galvanized sheets, and applied with a side lap of two full corrugations and an end lap of 9 in. Sheets shall span at least two purlin (or batten) spacings and be secured to (a) all purlins (or battens) with spring-headed roofing nails (or galvanized screws and washers) pierced through the top of every second corrugation; (b) steel purlins with ..... in. galvanized hook bolts provided with galvanized and lead washers, three to each sheet or spaced as indicated on details.

The gable rake shall be finished by applying (a) wood barge board and cap as specified in "Carpenter"; (b) 24 gauge ..... in. capping secured with 16 gauge clips spaced at approximately 3 ft. centres and fixed (a) to wood framing with galvanized screws and washers; (b) with ..... in. galvanized bolts and washers to the roofing and siding sheets forming the gable rake.

Curved sheets at the head of sawtooth roof shall be curved to a ..... in. rise and provided with ..... x ..... in. batten secured to sheets with (a) spring-headed nails; (b) galvanized screws and washers. This batten shall provide fixing for the outer edge of galvanized bird wire secured as shown on detail drawing.

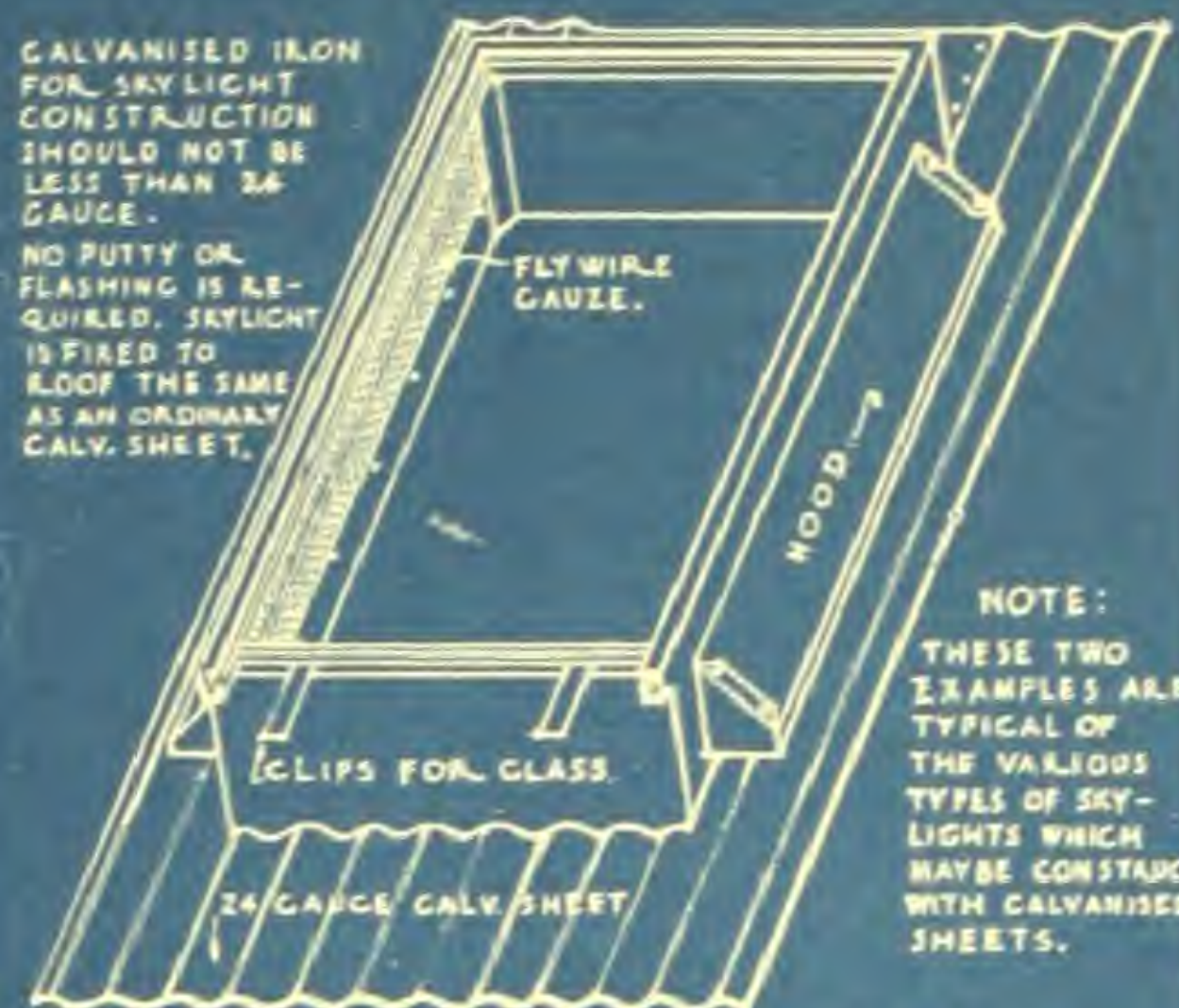




FIXED UNVENTILATED SKYLIGHT.

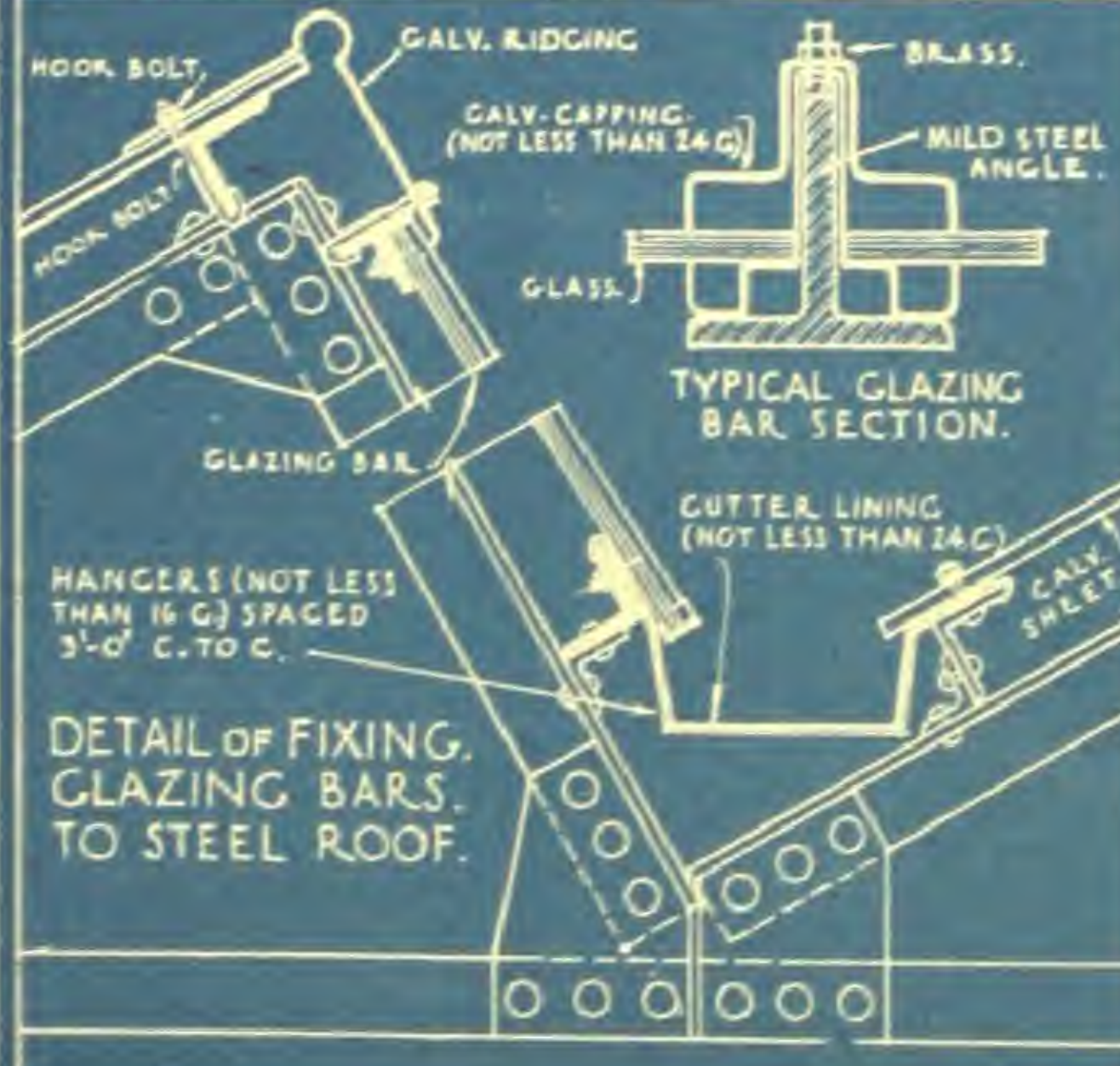
GALVANIZED IRON FOR SKYLIGHT CONSTRUCTION SHOULD NOT BE LESS THAN 24 GAUGE.

NO PUTTY OR FLASHING IS REQUIRED. SKYLIGHT IS FIRED TO ROOF THE SAME AS AN ORDINARY CALV. SHEET.



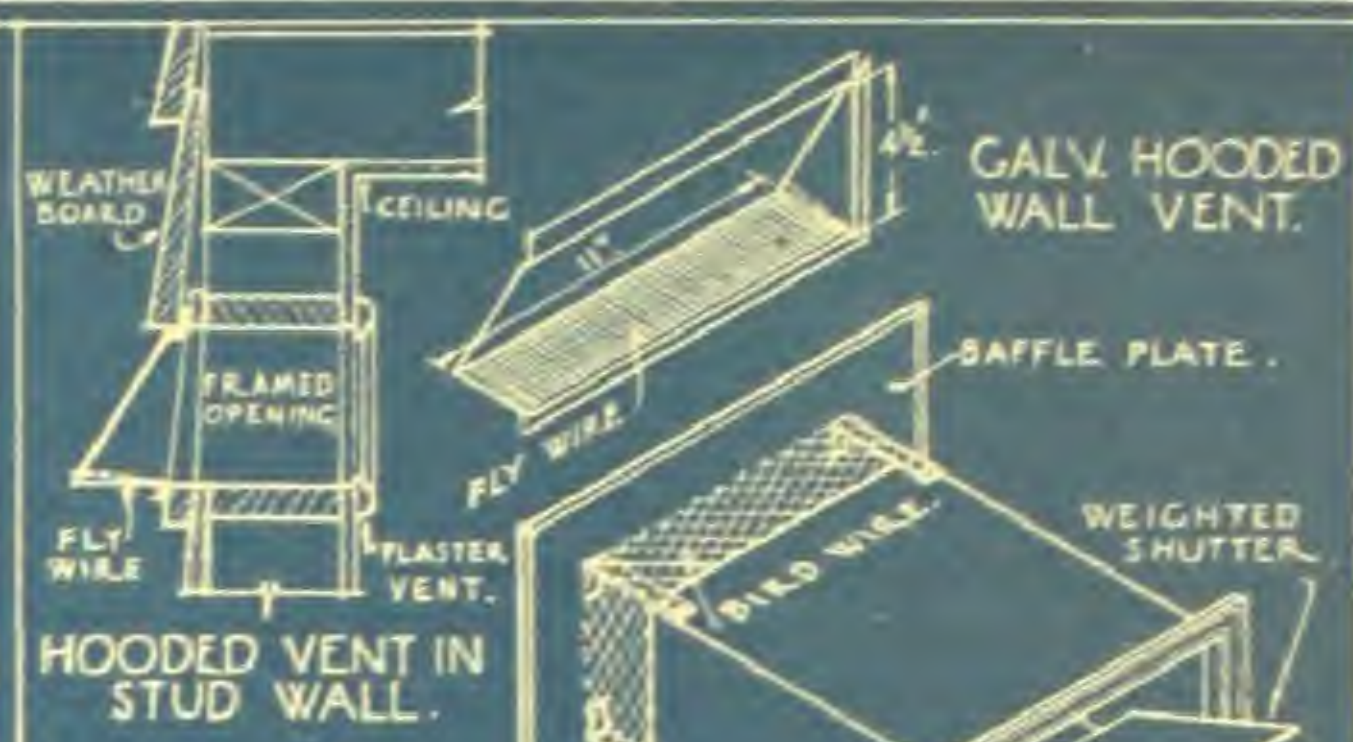
SKYLIGHT WITH SIDE VENTILATION.

NOTE: THESE TWO EXAMPLES ARE TYPICAL OF THE VARIOUS TYPES OF SKYLIGHTS WHICH MAY BE CONSTRUCTED WITH GALVANIZED SHEETS.



DETAIL OF FIXING GLAZING BARS TO STEEL ROOF.

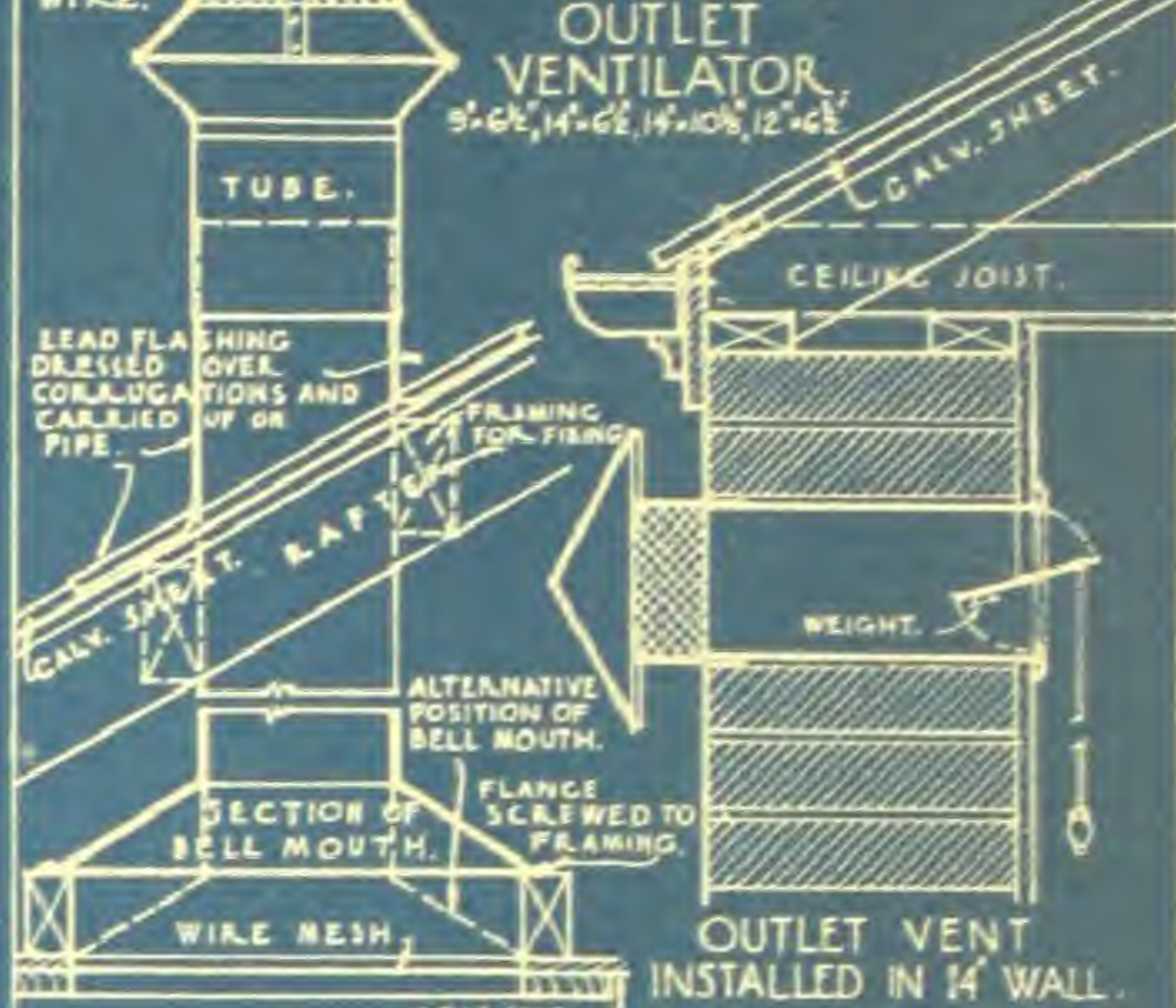
TYPICAL GLAZING BAR SECTION.



GALV. HOODED WALL VENT.

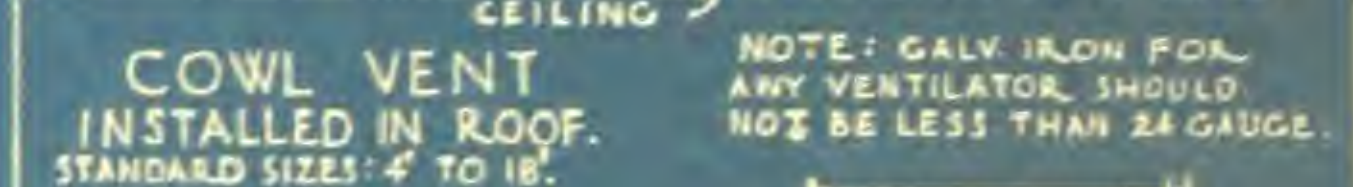


HOODED VENT IN STUD WALL.



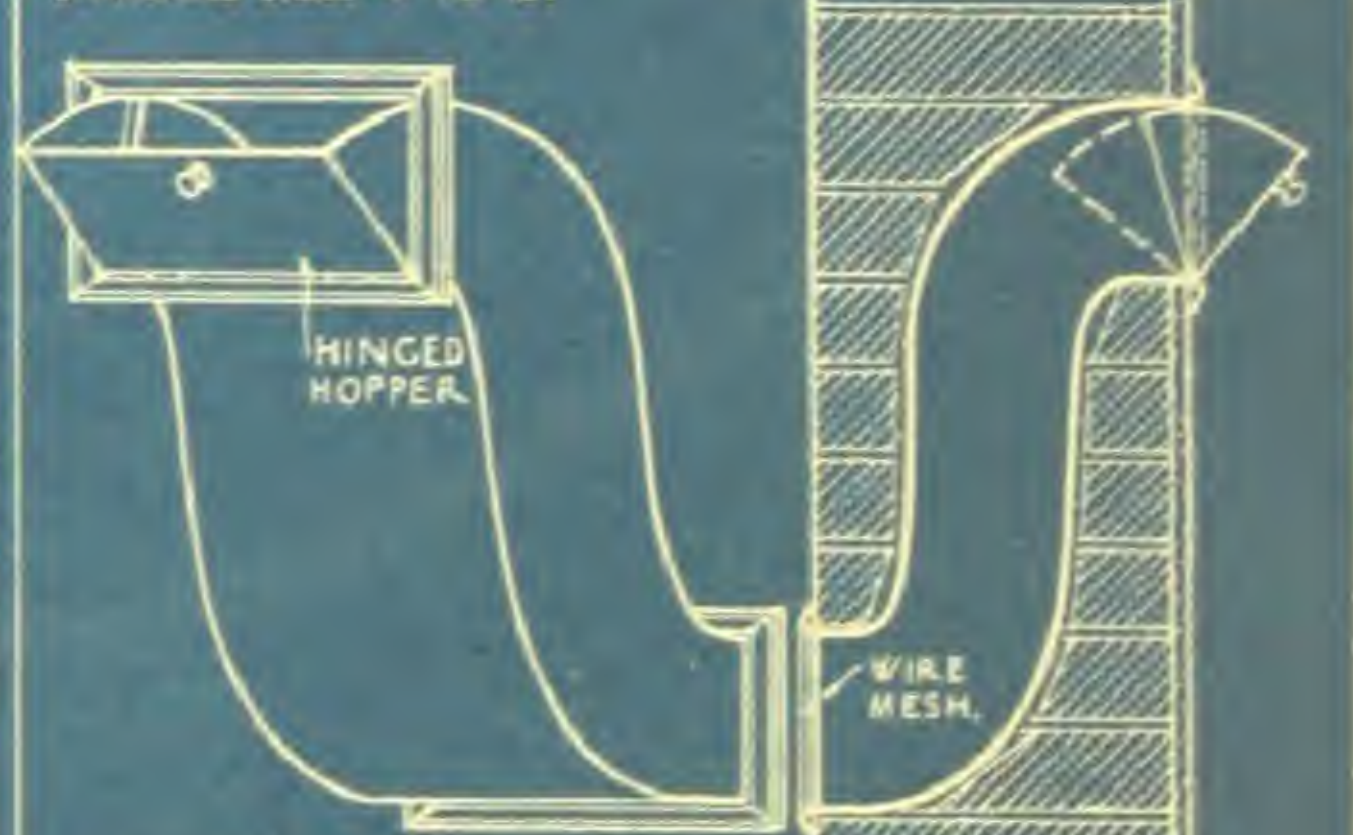
OUTLET VENTILATOR.

9'x6 1/2", 14'x6 1/2", 14'x10 1/2", 12'x6 1/2"



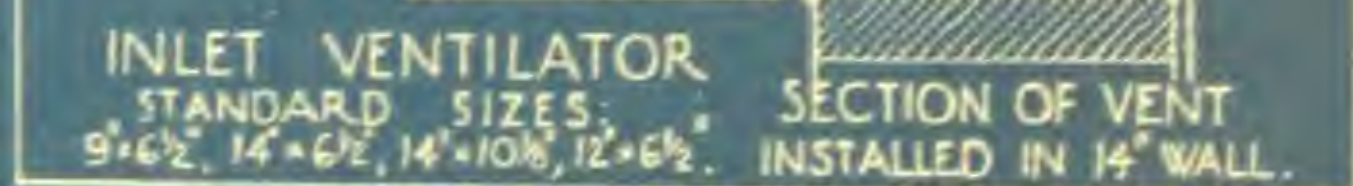
OUTLET VENT INSTALLED IN 14" WALL.

NOTE: GALV. IRON FOR ANY VENTILATOR SHOULD NOT BE LESS THAN 24 GAUGE.



COWL VENT INSTALLED IN ROOF.

STANDARD SIZES: 4' TO 18'.



INLET VENTILATOR.

STANDARD SIZES: 9'x6 1/2", 14'x6 1/2", 14'x10 1/2", 12'x6 1/2".

SECTION OF VENT INSTALLED IN 14" WALL.



## DETAILS OF GALV. IRON SKYLIGHTS GLAZING BARS AND VENTILATORS

DRAWING  
No. 4.  
22<sup>ND</sup> DEC. '30.



## ORB GALVANIZED SHEETS

### SKYLIGHTS, GLAZING BARS AND VENTILATORS

#### General

The formation of skylights, ventilators and glazing bars is usually entrusted to sheet-metal specialists, whose patented systems, in the majority of cases, includes the exclusive use of "QUEEN'S HEAD" sheets as the galvanized sheet metal. This can be readily appreciated when the great strength and rigidity which these sheets impart to the articles are considered.

#### Skylights

With few exceptions, galvanized metal skylights usually consist of four different types, viz.:—

- (i) Fixed unventilated type.
- (ii) Fixed ventilated type.
- (iii) Unventilated type fitted with lever and pulley for opening.
- (iv) Ventilated type fitted with lever and pulley for opening.

All the above skylights are obtainable in varying measurements, according to the manufacturer's stock sizes.

Typical examples of fixed unventilated and ventilated skylights are shown on Drawing No. 4. The fixed unventilated type, in this case, is provided with a centre glazing bar, which is a necessity for all skylights of extreme widths. The glass is inserted in the frame of the skylight, and secured in position with galvanized clips at the bottom, being supported at the centre by means of the glazing bar. In better-class skylights, this centre bar is reinforced with a steel section.

Ventilation is provided at the sides with perforated zinc or wire gauze, which is protected from the weather by means of galvanized hoods, thus making the ingress of rain impossible.

Opening skylights are similar in construction to the other types, but the glass panes are so framed that they may be operated from below by means of cords, pulleys and levers.

#### Glazing Bars

The glazing of saw-tooth roofs and other large areas is most effectively carried out by the use of patented glazing bars, which generally consist of special steel sections complete with condensation channels and glazing capping. The applications of glazing bars to saw-tooth roofs are shown on Drawings Nos. 2 and 4, the latter drawing showing the cross-section of a typical bar.

The outstanding features of such bars are:—Provision for draining away condensed moisture; maximum light area freedom for expansion and contraction of glass, and light construction.

In most cases, the bars are delivered already drilled, ready for bolting or screwing to purlins. The recommended spacing of bars is 2 ft. centres.

#### Ventilators

The usual types of ventilators are indicated on Drawing No. 4. The sheet metal used in the construction of any of these vents should not be less than 24-gauge. The first three types are suitable for use in public or semi-public buildings.

**Inlet Ventilators.**—These vents, as shown in drawing, are provided with hinged hoppers, which regulate incoming draughts. The usual position in walls is about 6 ft. 6 in to 7 ft. from floor line to lower edge of internal face of ventilator. Sizes are as shown on drawings; an additional size, 12 x 5 in., is available for stud-wall installations.

**Outlet Ventilators.**—Are provided with weighted shutter, external baffle plate and bird wire, and are placed near the ceilings. In addition to the given sizes, there is also made a 12 x 5 in. size, suitable for installing in stud walls.

**Cowl Vents.**—Are suitable for installing at ceiling levels. Standard sizes, together with a typical installation, are shown.

**Hooded Wall Vents.**—These are largely used because of their low cost and simplicity of installing in stud walls of domestic buildings.

### MISCELLANEOUS DATA

#### Painting of Galvanized Sheets

If possible, the painting of galvanized sheets should be delayed six or nine months after they are fixed. But if this is impossible, the sheets may be washed with acetic acid and then thoroughly washed again with water and allowed to dry before the paint is applied.

There are also available various priming coats which are prepared ready for application to the surfaces of new galvanized sheets.

Where exposed to sea air or acid vapours, the sheets should be painted with oxide of zinc, which is more efficient than white lead.

In all cases be sure that sheets are thoroughly dry before painting, as this is the usual cause for paint not adhering to the surface.

Side and end laps should always be painted before fixing.

#### Solder

Ordinary solder consisting of even parts of tin and lead, and fluxes of resin or spirits of salts is generally used for soldering galvanized sheets.

The connecting parts of sheets or fittings should be in tight contact and thoroughly cleaned before flux is applied.

#### Ventilating Ducts

"QUEEN'S HEAD" galvanized sheets are recommended for use in the construction of ventilating ducts—their uniform quality, retention of shape and rigidity when bent into circular sections and resistance to the corrosive action of gases make them highly suitable for all classes of conduit and airduct work.

The following sizes and gauges are recommended for circular and rectangular sections:—

B.G. . . . .	26	24	22	20	18	16
Round—diameter (inches) . . . .	15	30	42	54	72	above
Rectangular—longest side (inches) . . . .	18	26	40	72	84	above

#### INSTALLATION NOTES.

All ducts having a cross-sectional area of six square feet or larger, should be stiffened with internal corner angles riveted to duct.

Make all ducts with slip joints in the direction of the air flow.

Ducts should be essentially airtight—made up with standing seams.

All duct work should be supported in a substantial manner. Small ducts should be supported with heavy strap-iron hangers; large-size ducts by angles with vertical rod hangers.

(Continued on next page)



## ARCHITECT'S SPECIFICATION

(Continued from Page 9)

## WALL SIDING SHEETS

Wall framing shall be covered with ..... ft. 24 gauge corrugated sheets applied with side laps of (a) 1½ corrugations; (b) 2 corrugations, and an end lap of 6 in.

Note.—Complete paragraph, specifying sheets to be secured to side purlins or nogging with same methods of fixing as provided for roofing sheets.

## EAVES FINISH

The sheets shall be finished at (a) the eaves; (b) the gable, by cutting them parallel to the rake and by (a) applying a wood fascia as specified in "Carpenter"; (b) bringing them in to firm contact with the underside of projecting roofing sheets.

## CORNER FINISH

The corners of galvanized sheet walls shall be finished with (a) 22 gauge; (b) 24 gauge ..... in. capping secured with 16 gauge clips spaced at 3 ft. centres and fixed (a) with galvanized screws and washers to corner posts; (b) to siding sheets with ..... in. galvanized bolts and washers.

## INTERNAL LININGS

Note.—First specify the areas to be lined, such as the soffits of stairs, partition linings, etc.

The foregoing linings shall consist of (a) 26 gauge; (b) 28 gauge ..... ft. standard 1 in. corrugated sheets applied with a lap of ..... corrugations, and secured to wood framing with roofing nails.

## SKYLIGHTS

Provide and install where directed No. .... brand skylights.

Skylights shall be 24 gauge (a) fixed ventilated type; (b) fixed unventilated type; (c) ventilated type fitted with lever and pulley for opening; (d) unventilated type fitted with lever and pulley for opening.

Skylights shall be complete with condensation gutters, capping and clips; all centre bars over 4 ft. in length shall be of special steel glazing bar sections.

Glazing shall be as specified in "Glazier."

## GLAZING BARS

Glazing bars shall be of an approved brand with sections designed to prevent the ingress of water from the outside, and constructed with condensation channels on the inside. Galvanized metal shall be of 24 gauge and shall be reinforced with mild steel sections when spans exceed 6 ft.

Bars shall be spaced at ..... ft. centres, securely (a) screwed, (b) bolted to roof framing.

Glazing shall be as specified in "Glazier."

## VENTILATORS

Provide and install where directed the following ventilators, which shall be of ..... (state brand or make), and constructed to the requirements of the "....."

Note.—The local body who has jurisdiction over the work.

(a) Nos. .... X ..... in., 24 gauge sheet metal inlet ventilators, the full depth of walls and fitted complete with hinged hopper and external wire mesh. Ventilators shall be carefully installed in walls, having a height of ..... ft. .... in. from floor line to the lower edge of internal face of hopper.

(b) Nos. .... X ..... in., 24 gauge sheet metal outlet ventilators, the full depth of walls and fitted complete with weighted shutter, external baffle plate and bird wire.

(c) Nos. .... X ..... in. diameter, 24 gauge sheet metal cowl vents fitted complete with exhaust cowls, tubing and bellmouths, with the latter properly screwed to supporting framing. Corrugated sheets shall be cut to permit the vents passing through roof; and flashing at this juncture shall consist of 4 lb. milled lead dressed over roofing corrugations and carried upon the tubing.

## TABLES

## TRANSVERSE STRENGTH OF CORRUGATED SHEETS.

Let  $W$  = breaking weight in tons (distributed)  
 $L$  = unsupported length of sheet in inches  
 $t$  = thickness of sheet in inches  
 $b$  = covering width of sheet in inches  
 $d$  = depth of corrugations in inches

$$\text{then } W = \frac{44.6 + bd}{L}$$

Allowing a factor of safety of 5, then  $\frac{W}{5}$  = safe uniformly distributed load in tons.

SAFE UNIFORM LOAD IN POUNDS ON OREGON PURLINS—ONE INCH THICK.  
(Fibre stress—1,200 lbs. per sq. in.)

Span in Feet	Depth of Purlins in Inches						
	4	5	6	7	8	9	10
8	270	415	480	650	850	1080	
10	210	335	480	650	850	1080	
12	180	280	400	550	710	900	1110
14		240	345	470	610	770	955
16		210	300	410	535	680	835
18				360	470	600	740

## EXAMPLE—

Span of purlins (i.e., distance of trusses c. to c.) = 14 feet.  
 Spacing of purlins c. to c. = 3 feet.  
 Load = 30 lbs. per sq. ft. of roof area (includes 20 lbs. for live load and 10 lbs. for weight of purlins and roofing iron).  
 Total load on purlin =  $30 \times 3 \times 14 = 1,260$  lbs.  
 Select a depth of purlin, say 6 in.  
 Referring to table above for span, 14 feet, and depth of purlin, 6 inches, it will be found that 350 lbs. is the safe uniform load for a beam 1 inch thick; then 1,260 divided by 350 = 3.6 inches; use a 4 inch thick purlin.

DEFINITION OF THE BIRMINGHAM SHEET GAUGE  
i.e. (B.G.).

Approximate Inch	Gauge	Decimal of an Inch	Approximate Inch	Gauge	Decimal of an Inch
1/8th	10	.125	1/28th	20	.039
3/32nd	12	.099	1/32nd	22	.031
5/64th	14	.078	1/40th	24	.025
1/16th	16	.062	1/50th	26	.020
1/20th	18	.050	1/64th	28	.016

## Tank Sizes

## CIRCULAR—CORRUGATED

Diameter	Height of Tank			
	4 ft.	5 ft.	6 ft.	8 ft.
ft. in.	gal.	gal.	gal.	gal.
3 3	200	250	300	400
3 6	240	300	360	480
3 9	280	350	420	560
4 0	310	390	470	620
4 4	—	—	540	720
4 6	—	—	590	787
5 0	—	—	720	960
6 0	—	—	1,050	1,400





# WUNDERLICH LIMITED

Manufacturers of

## Terra Cotta Roofing Tiles

Administration: BAPTIST STREET, REDFERN, SYDNEY, N.S.W.

Showrooms and Offices:

SYDNEY: Baptist Street, Redfern.  
 STH. MELBOURNE: 210 Hanna Street.  
 ADELAIDE: Grote and Morphett Streets.  
 PERTH: Lord and Short Streets.

BRISBANE: Amelia Street, Valley.  
 NEWCASTLE: Builders' Exchange, King St.  
 HOBART: 139 Macquarie Street.  
 LAUNCESTON: 71 St. John Street.

12e

S.A.A. File No.

[For Other Products, See Pages 22, 55, 102, 176 and 240]

### Products

Terra Cotta Tiles of various patterns, including the well-known Marseille pattern; and Shingle, Cordova (parallel sides), Mission large and Mission small (tapered sides), Italian, and Spanish-American.

### Colours

The colours comprise the familiar shades of red and chocolate, also numerous effects in glazed and semi-glazed finishes. These provide scope for roofing treatments of either rich individual colours or else intermingled shades producing an harmonious blending of bright colouring.

### Accessories

Ridging, Finials and Cresting, in colours and glazes to match the Tiles, are available in a variety of sizes and patterns.

### Qualities and Advantages

Wunderlich Terra Cotta Roofing Tiles are renowned for their extreme hardness, trueness to shape and size, and wide variety of colours and patterns. Their prolific use throughout the Commonwealth is conclusive evidence as to the advantages they offer. Not only are they much more attractive than other types of roofing, but they retain this quality indefinitely, and outlast the structures they grace. There is no upkeep cost.

Below—Wunderlich Cordova Tiles (Chocolate Colour).



Marseille Pattern Wunderlich Tiles.

### Glazed Tiles for Country Homes

For Country homes, where the conservation of every drop of rain water is a consideration, we offer glazed and semi-glazed Tiles, which are virtually non-absorbent.

### Experience and Facilities

There is a Wunderlich plant for the manufacture of Terra Cotta Roofing Tiles in every State, with the exception of Tasmania, where, however, ample stocks are maintained. We are the largest manufacturers of these Tiles in the Southern Hemisphere.

### Methods of Fixing

On account of the slight variations in sizes of Tiles manufactured by the various Wunderlich plants, it is not possible to provide reliable data here as to spacing of battens or methods of fixing, but complete information will be supplied by our nearest Sales office, on request.

(Continued on next page)



**Correct Lengths of Rafters**

A saving in labour is effected, and a more secure roof results, if the rafters are cut to a length that will permit of the use of whole (or uncut) Tiles for the last row, finishing at the ridge. On application, we will provide a "rafter card" giving the correct lengths of rafters according to the number of rows of Marseille pattern Tiles the roof involves.

**Estimates for Roofs—Fixed**

Quotations for roofs of Wunderlich Tiles, fixed complete in any part of the Commonwealth, will be furnished on request.

**Sample-Board Displays**

Show Boards displaying sample roofs are on view at the Showroom or Works in every State. These Boards embrace a wide range of colours and patterns, enabling the architect to make his selection under ideal conditions.

**Booklet in Colours**

Our Booklet, "Roofs of Tile," providing illustrations in colours of Wunderlich Tile Roofs, will be sent, post free, to any architect or builder enquiring.



A masterpiece of colour and texture—this roof of Wunderlich Colour-Blend Tiles, Cordova Pattern.



There is refinement in a treatment with Wunderlich Shingle-Pattern Terra Cotta Tiles of intermingled colours; in marked contrast with the rugged beauty of Cordova and Mission Pattern Tiles.



LUXFER

## BROOKS, ROBINSON &amp; Co. LTD.

ELIZABETH STREET, MELBOURNE  
WORKS: MAFFRA STREET, SOUTH MELBOURNE

Telephone M 3131 (5 lines)

12j

S.A.A. File No.

[For Other Products, See Pages 70, 141, 172, 235 and 468]

## THE "LUXFER" SYSTEM OF ROOF GLAZING

## Description

The "Luxfer" patented system is one of the original forms of puttyless roof glazing. Many years of practical experience with roof glazing under all sorts of weather conditions has resulted in the production of glazing bar units, having the qualities of strength, simplicity, endurance and adaptability to all types of roof construction.

The "Luxfer" glazing bar units are available in two sizes—No. 2 and No. 3 sections for spans (without the use of purlins) up to 6 and 10 feet respectively. Both sections with details of application are shown on the two following pages—a study of which will show the simplicity of the assembled units. In both cases the unit consists of a specially rolled and galvanized section acting as a combined condensation gutter and supporting bar for the glass, which is secured by a rolled copper cap fixed down with bronze bolts and nuts. A strip of asbestos is placed between the cap and glass to ensure a tight connection and prevent any great movement of the glass. The combined supporting bar and condensation gutter is of special interest, as it overcomes the inherent defects of built-up sheet-metal condensation gutters which are characteristic of some glazing bars.

## ADAPTIBILITY

All forms of roofs, including domical and spherical shapes, have been successfully glazed with the "Luxfer" patented system of roof glazing. The accompanying drawings, and the specifications prepared for the architect's use, indicate the simplicity of application. Drawing No. 1 shows the glazing to a steel saw-tooth roof, and Drawing No. 2 illustrates the simple and well-constructed features of the "Luxfer" system of skylight construction. Of particular interest in this construction is the manner in which the skylights are made completely dust-proof.

## FEATURES

A brief summary of the general features of the "Luxfer" glazing bar unit is as follows:—

1. **Permanence.**—With the exception of the metal glass stop at the lower end of the bar, only the glass and copper capping are exposed to the weather. "Luxfer" glazing is positively watertight and should therefore last as long as the building.
2. **Freedom for expansion and contraction of glass.**—The glass is held in place by the copper capping without the use of putty. It is tight, yet free to expand and contract, thus eliminating glass breakage.
3. **Condensation Gutters.**—These are so designed that condensed moisture is rapidly conducted to the exterior. There is also formed between the glass bearing and stem of the section a drip gutter which catches any possible leakage.
4. **Ease of Glass Replacement.**—By unscrewing the nuts of the bronze bolts, the capping can be removed easily for necessary glass replacements caused by accidents.
5. **Other Advantages.**—Admittance of maximum daylight; formation of dust-proof skylights; and ease of erection.

## SERVICE AND ERECTION

For many years, Brooks, Robinson & Co. Ltd. have been engaged in solving intricate roof glazing problems. Our engineering staff is at all times ready to co-operate with you by means of a personal call or by preparation of detailed drawings, without obligation on your part.

No matter how good a roof-glazing system may be, if it is not properly assembled and applied there is always the possibility of leakage. This makes everybody concerned dissatisfied with the work; so to ensure proper erection, we maintain a skilled erection division, who can be sent to any part of the Commonwealth.

## ARCHITECT'S SPECIFICATION

## SAW-TOOTH GLAZING.

Note.—Work by others—Unless otherwise specified, all steel or wood roof framing, gutters, ridgings and flashings shall be provided for in another portion of the architect's specification.

Where shown on drawings, saw-tooth glazings shall be of the "Luxfer" Patented System of Roof Glazing provided and fixed complete by Brooks, Robinson & Co. Ltd., who shall make all necessary arrangements with the general contractor for his co-operation in this work.

The construction shall be as follows:—

- (1) Glazing bar sections shall be "Luxfer" (a) No. 3, (b) No. 2 galvanized steel sections properly (a) countersunk bolted to steel roof framing, (b) screwed to wood framing.
- (2) The glazing shall consist of 24 in. wide 1 in. wired glass, which shall be secured by.....gauge copper capping fixed down to the steel sections with bronze headless bolts and nuts. A strip of asbestos cord shall be placed, parallel with the run of glazing bars, between all glazing capping and glass.

## SKYLIGHT CONSTRUCTION.

Note.—Work by others—Unless otherwise specified, all wood or concrete curbs shall be provided by others.

Skylight construction shall consist of the "Luxfer" patent Improved System of Roof Glazing provided and fixed complete by Brooks, Robinson & Co. Ltd., who will be required to submit detailed drawings for the approval of the architect.

The construction shall be as follows:—

## HIPPED SKYLIGHTS.

- (3) Hips and ridges shall consist of 2 in. mild steel star sections framed and erected with all proper connections.

- (4) Glazing bar section shall be "Luxfer" (a) No. 3, (b) No. 2, galvanized steel sections, countersunk bolted at the ridge and hips to the flanges of star section, and secured at the (a) concrete curb by countersunk riveting to a 2 in. x 1/2 in. steel plate, which in turn shall be fixed to the concrete with rag bolts (or approved expansion fittings), (b) wood curb with.....inch screws.
- (5) Use paragraph 2.
- (6) The skylights shall be rendered dust-proof by 1 in. x 3/4 in. dust strips (grooved and fitted with asbestos cord) applied to the curb. These strips shall be supported by metal clips secured to the curb and flanges by the various bolts, screws or rivets employed in the fixing of glazing bars.
- (7) Ridging and hipping shall consist of (a) 24-gauge galvanized iron, (b).....gauge copper, (c) 4 lb. milled lead dressed over wood rolls.
- (8) Flashing at curb and where else necessary shall consist of 4 lb. milled lead.

## GABLE-END SKYLIGHTS.

Ridge shall be a 2 in. mild steel star section with gable consisting of 1 1/2 in. mild steel angle framing.

Note.—With the exception of references to hipping, paragraphs 4, 5, 6, 7, and 8 can be repeated. Paragraph 5 should be enlarged as follows:—

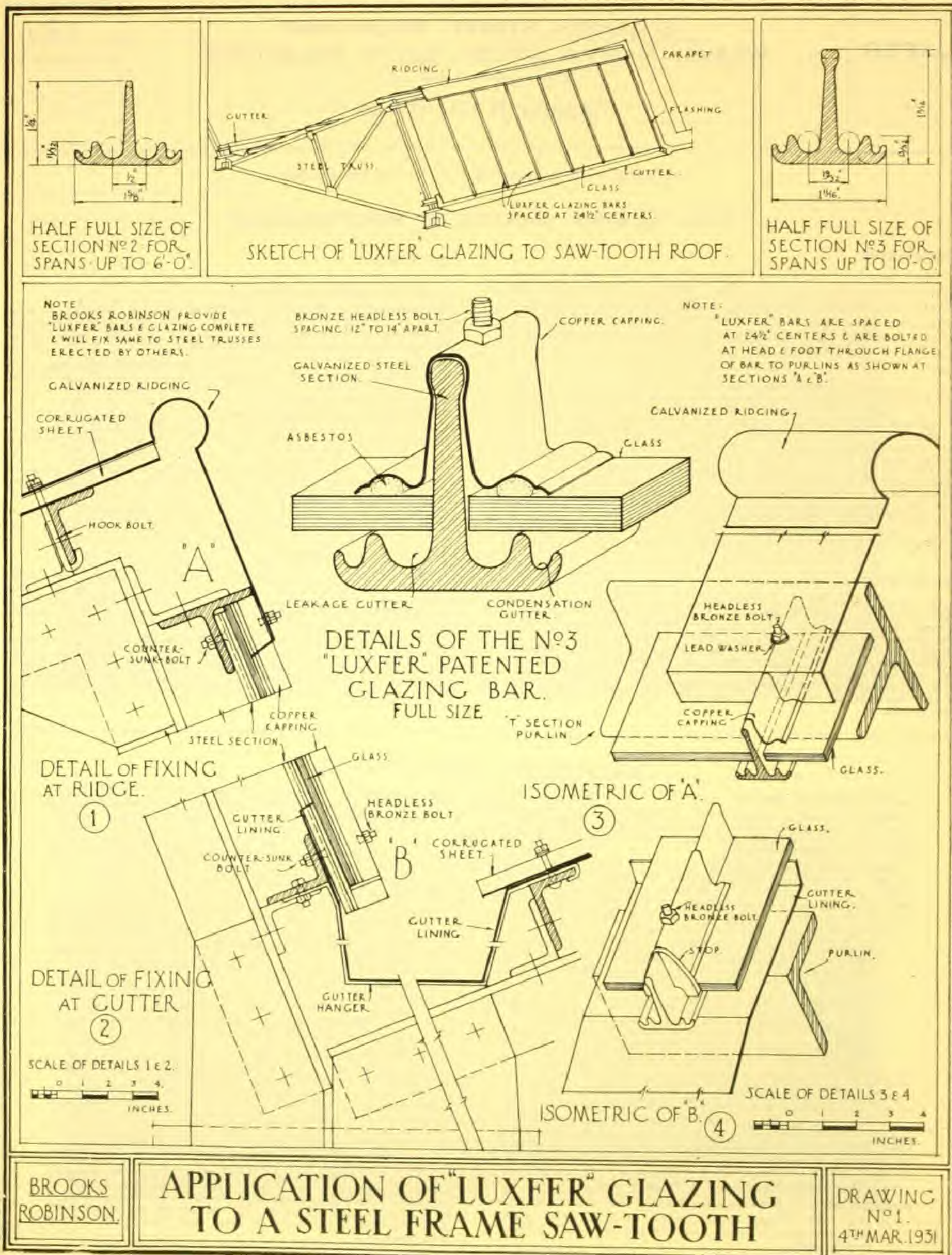
Gable end glazing shall consist of similar glass and shall be (a) securely beaded into framing with..... metal beads, (b) carefully set, embedded and back-puttied in mastic putty.

Notes on Specification.—(1) Where copper capping comes in contact with any galvanized iron, such as ridgings, hips, etc., the faces of the two metals should be insulated against each other in an approved manner; (2) If desired, other suitable glass may be used in lieu of that specified.

(Continued on next page)

HANSARD'S CATALOGUE

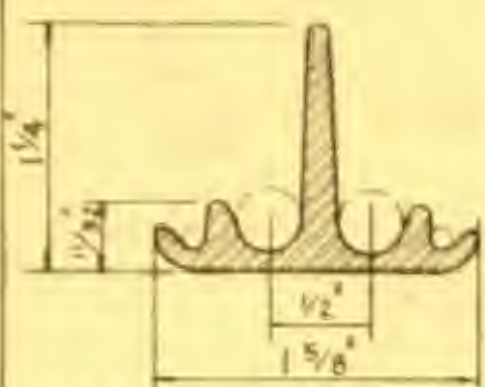




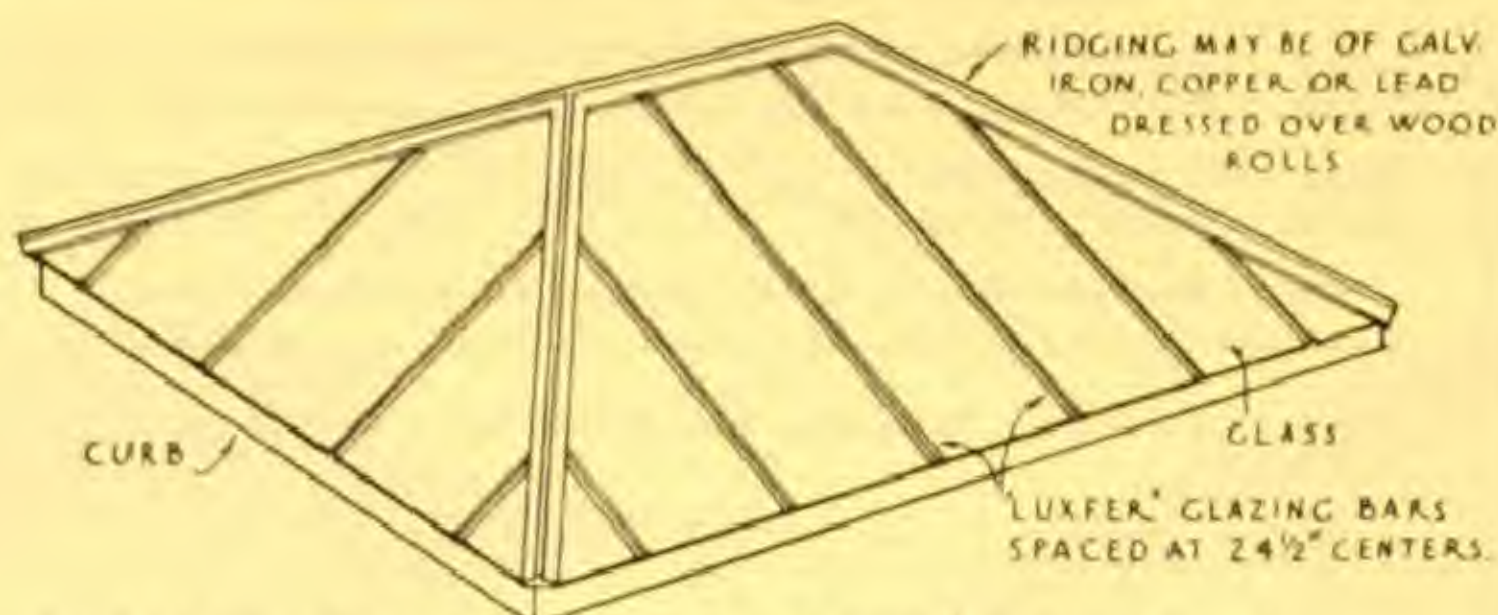
(The drawing on this page was produced by the Architectural Staff of Ramsay's Catalogue)

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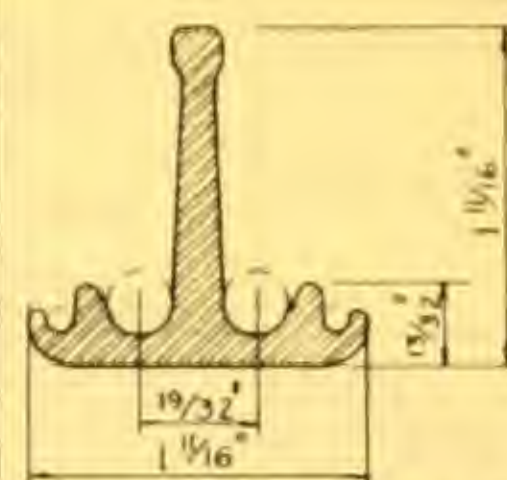




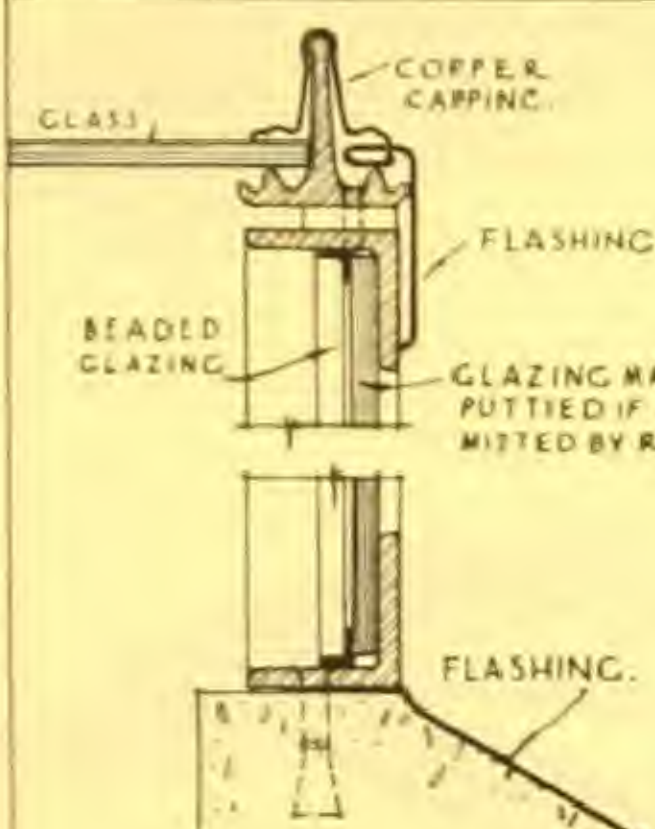
HALF FULL SIZE OF  
SECTION NO 2 FOR  
SPANS UP TO 6'-0"



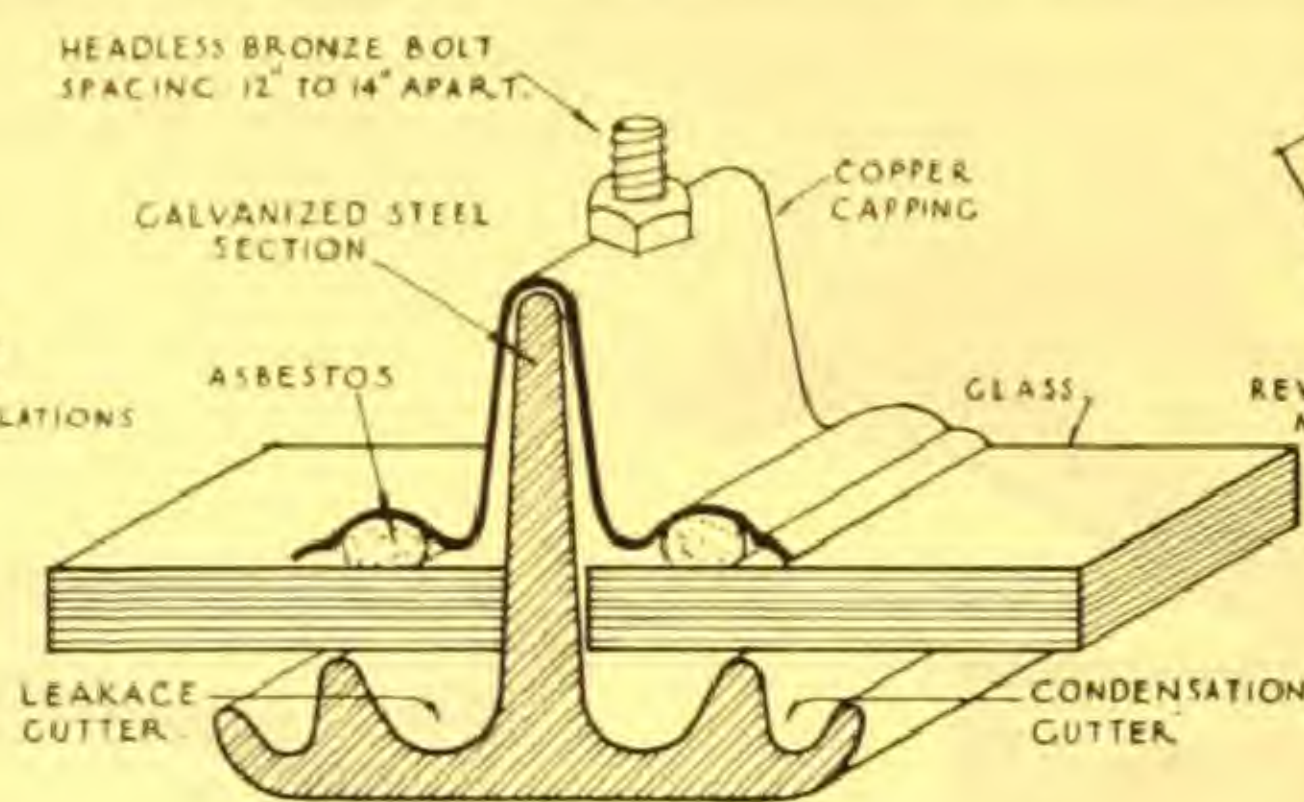
SKETCH OF TYPICAL "LUXFER" SKYLIGHT.



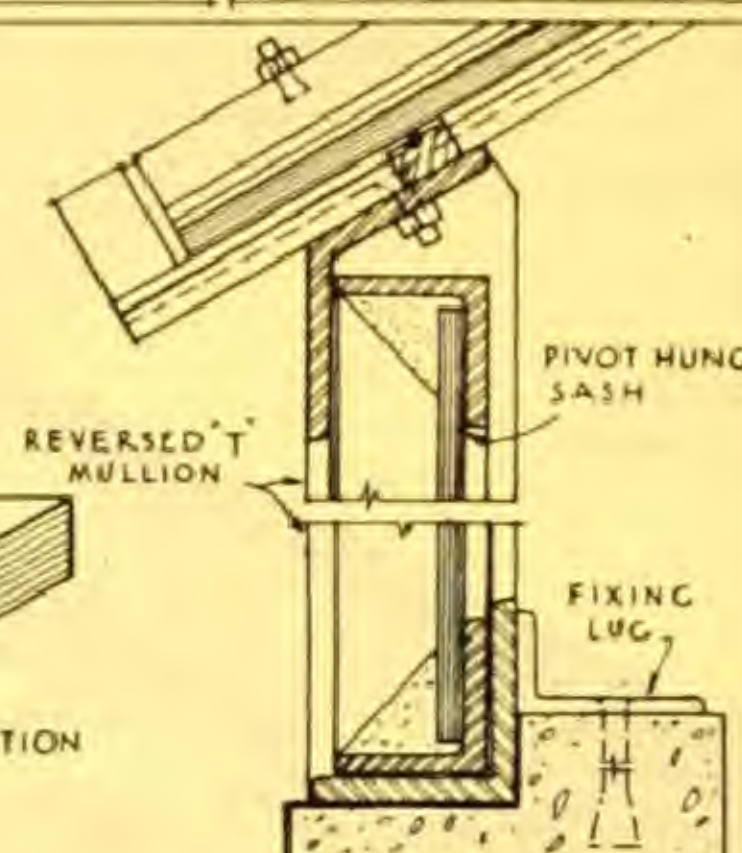
HALF FULL SIZE OF  
SECTION NO 3 FOR  
SPANS UP TO 10'-0"



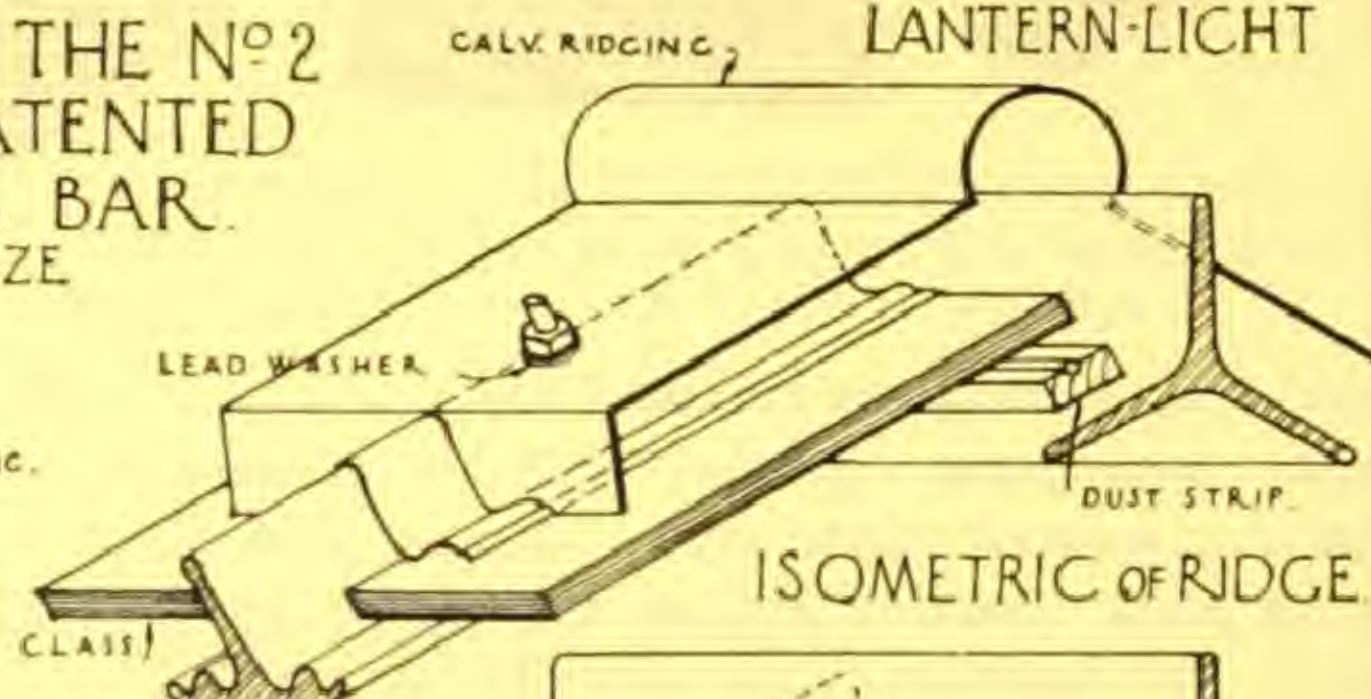
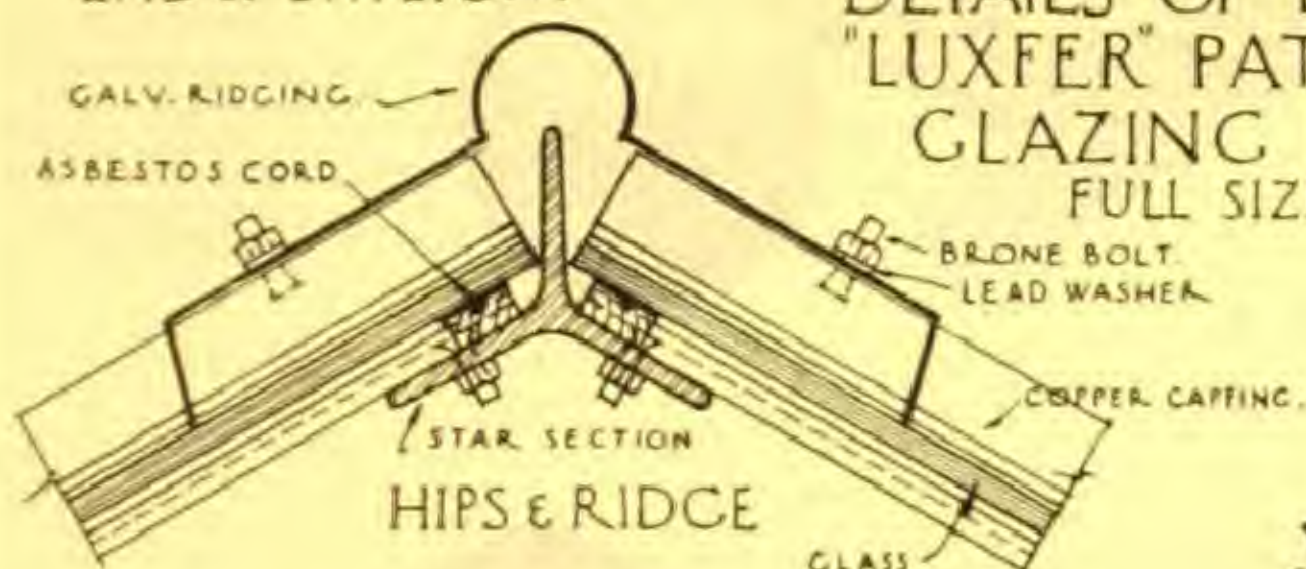
SECTION OF CABLE  
END OF SKYLIGHT



DETAILS OF THE NO 2  
"LUXFER" PATENTED  
GLAZING BAR.  
FULL SIZE



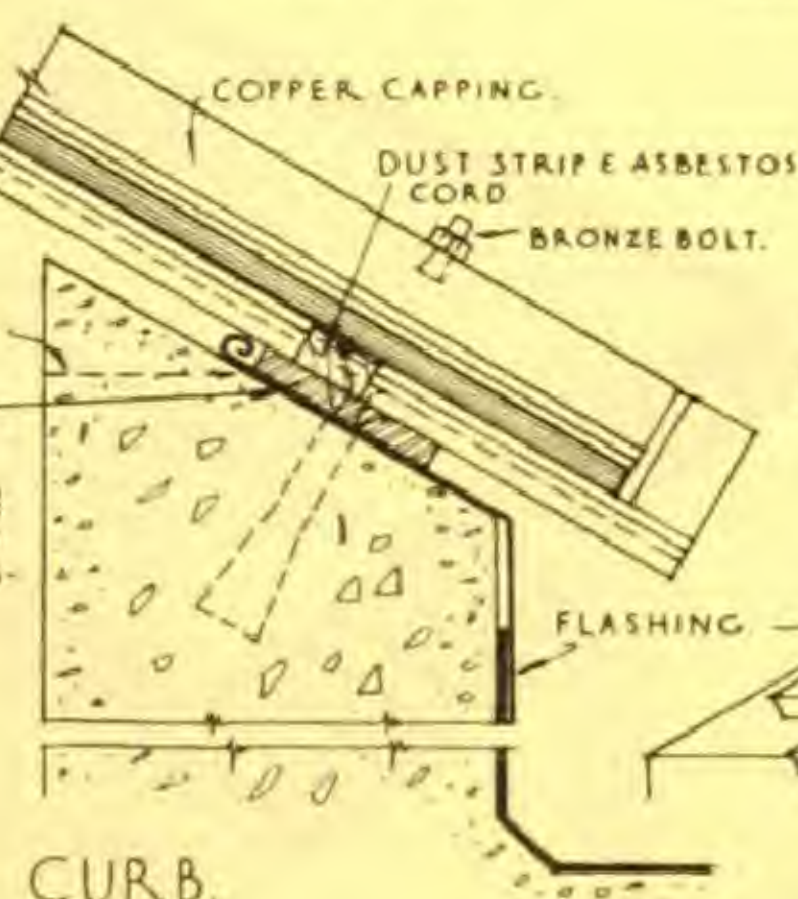
SECTION OF A  
LANTERN-LIGHT



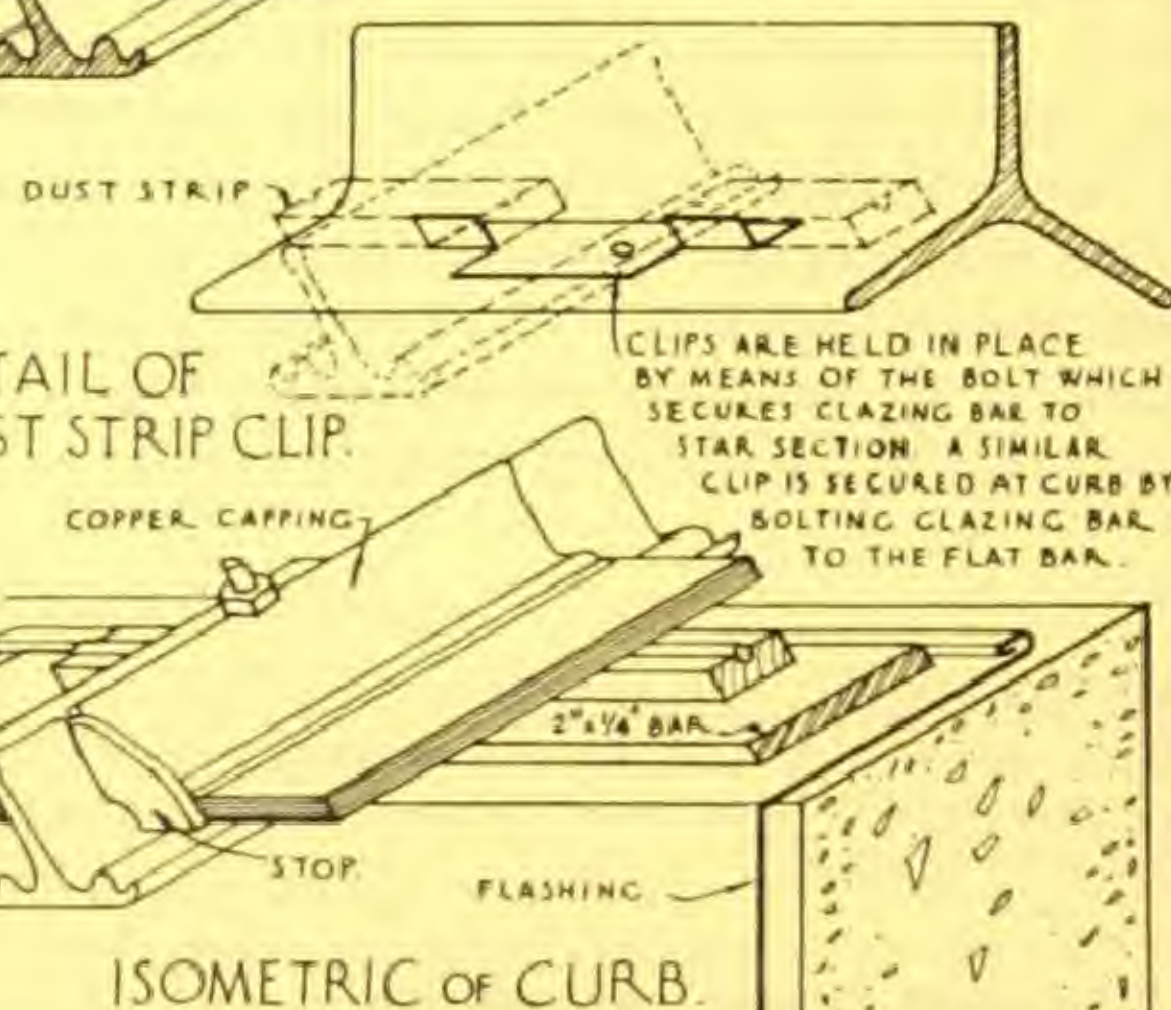
NOTE: COPPER RIDGING OR LEAD DRESSED OVER WOOD ROLLS MAY BE USED INSTEAD OF GALV. RIDGING.

TOP OF CURB FINISHED THUS IF SKYLIGHT HAS CABLE END 2" x 1/4" FLAT BAR BOLTED TO CURB WITH RAG OR EXPANSION BOLTS

NOTE: BROOKS ROBINSON PROVIDE AND FIX SKYLIGHT COMPLETE WITH ALL NECESSARY FRAMING, LUXFER GLAZING BARS, FLASHING GLASS, ETC. AS SHOWN ON DRAWING.



DETAIL OF  
DUST STRIP CLIP.



BROOKS  
ROBINSON

## DETAILS OF THE "LUXFER" SYSTEM OF SKYLIGHT CONSTRUCTION

DRAWING  
NO 2  
9TH MAR. 1931



<div>12j</div> <div>S.A.A. File No.</div>	<div> <h1>MALLEYS LTD.</h1> </div> <div> <p>MANUFACTURERS OF SKYLIGHTS GENERAL SHEETMETAL WORKERS VENTILATING ENGINEERS, ENAMELLERS, SHERIDISERS AND TINNERS</p> </div> <div> <p>Head Office and Showroom: 50-52 MOUNTAIN STREET, SYDNEY</p> </div> <div> <p>Factory: McEVoy STREET, ALEXANDRIA</p> </div> <div> <p>Postal Address: Box 2, G.P.O., George Street West, Sydney.</p> </div>	<div> <p>SUNRISE</p> </div>
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[For Other Products, See Pages 263 and 342]

## Malleys' Patent Skylights Mean More Daylight

They provide natural light and ample ventilation, and are used extensively in buildings of every description. Made for every roof under the sun.

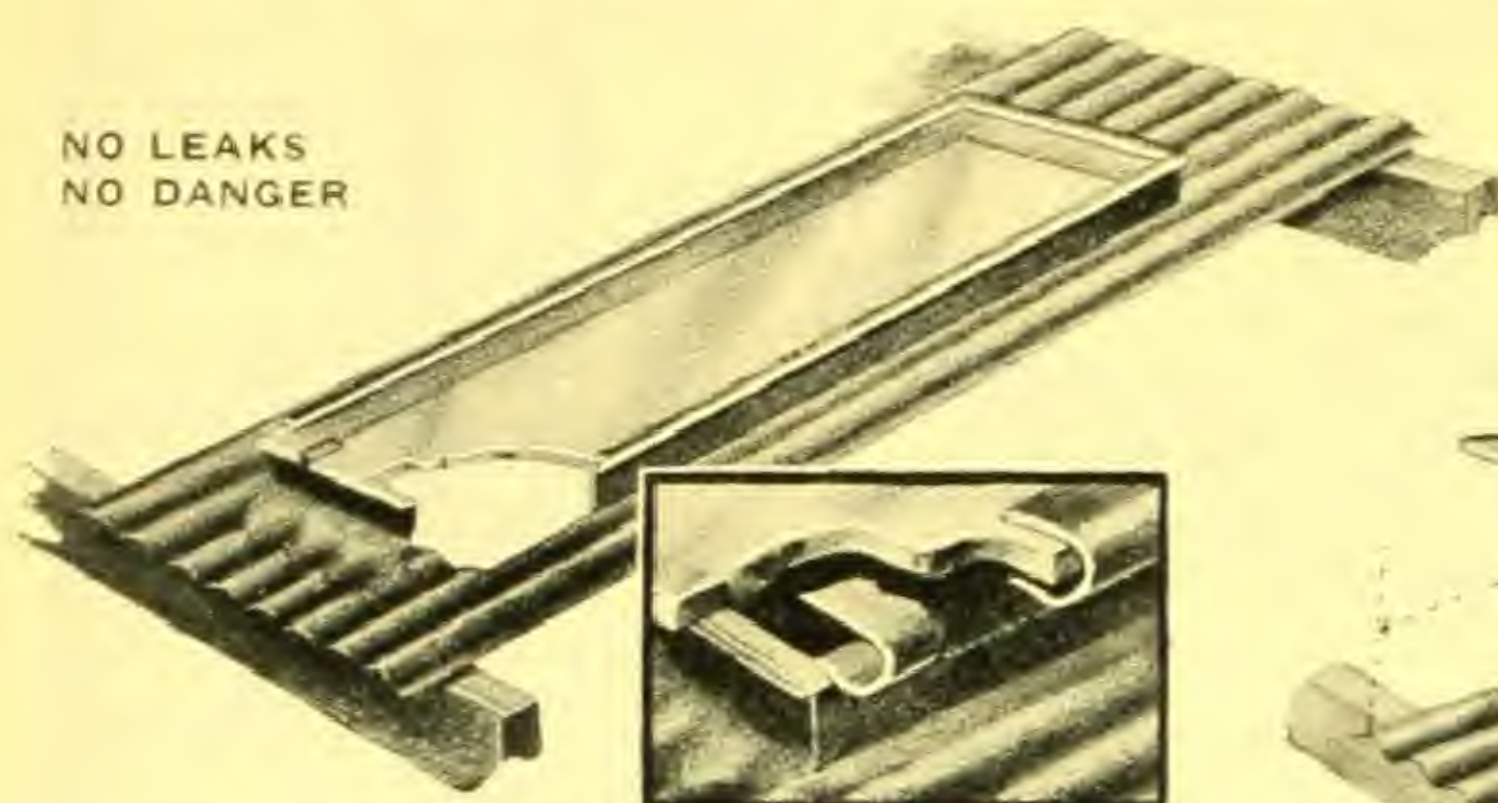


Fig. 1.

## Malleys' Patent Skylight (Fixed Type)

A most dependable skylight, built of reliable materials—guaranteed watertight. Glazed with  $\frac{3}{8}$  mill-rolled glass. Obtainable also with  $\frac{1}{4}$  in. wire-cast glass. The inset shows the method of fixing the glass to render the skylight watertight and leak-proof. As can be observed, packing is quite unnecessary. The deep channel for draining also prevents any leak around the glass. In stock sizes the light area is in the centre of the sheet, and measures approximately 39 in. long x 16 $\frac{1}{4}$  in. wide.

### MALLEYS SKYLIGHTS (Stock Sizes)

Length of Sheets—5, 7, 8, 9, 10, 11 and 12 ft.  
Sizes of Glazing—3 ft. 6 in. x 1 ft. 6 in.  
Gauge of Iron—26 or 24.

### WHEN ORDERING SPECIAL SKYLIGHTS

The following details (as shown in Fig. 2) are necessary:  
C—Length of sheet.  
A & B—Size of light area.  
D—Distance from end of sheet to inside light area.  
Fixed or opening type.  
Glazing mill-rolled or wire-cast.  
State gauge of sheet.

## Malleys' Patent Skylights (Opening Type)

The sizes and glazing are exactly the same as Fig. 1. Inset shows the special reinforcement of frame and the clips which secure and hold the glass.

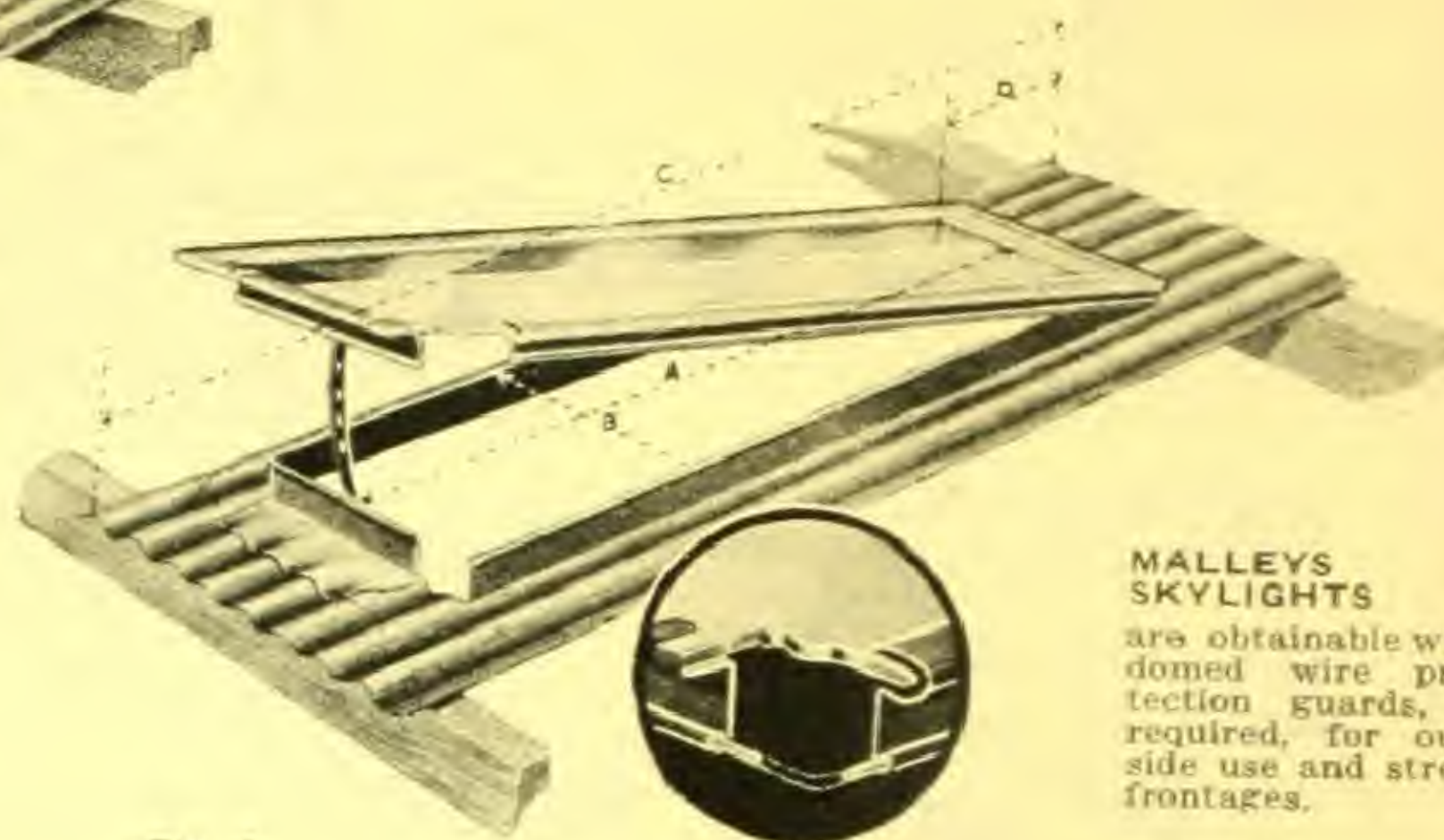


Fig. 2.

MALLEYS SKYLIGHTS are obtainable with domed wire protection guards, if required, for outside use and street frontages.

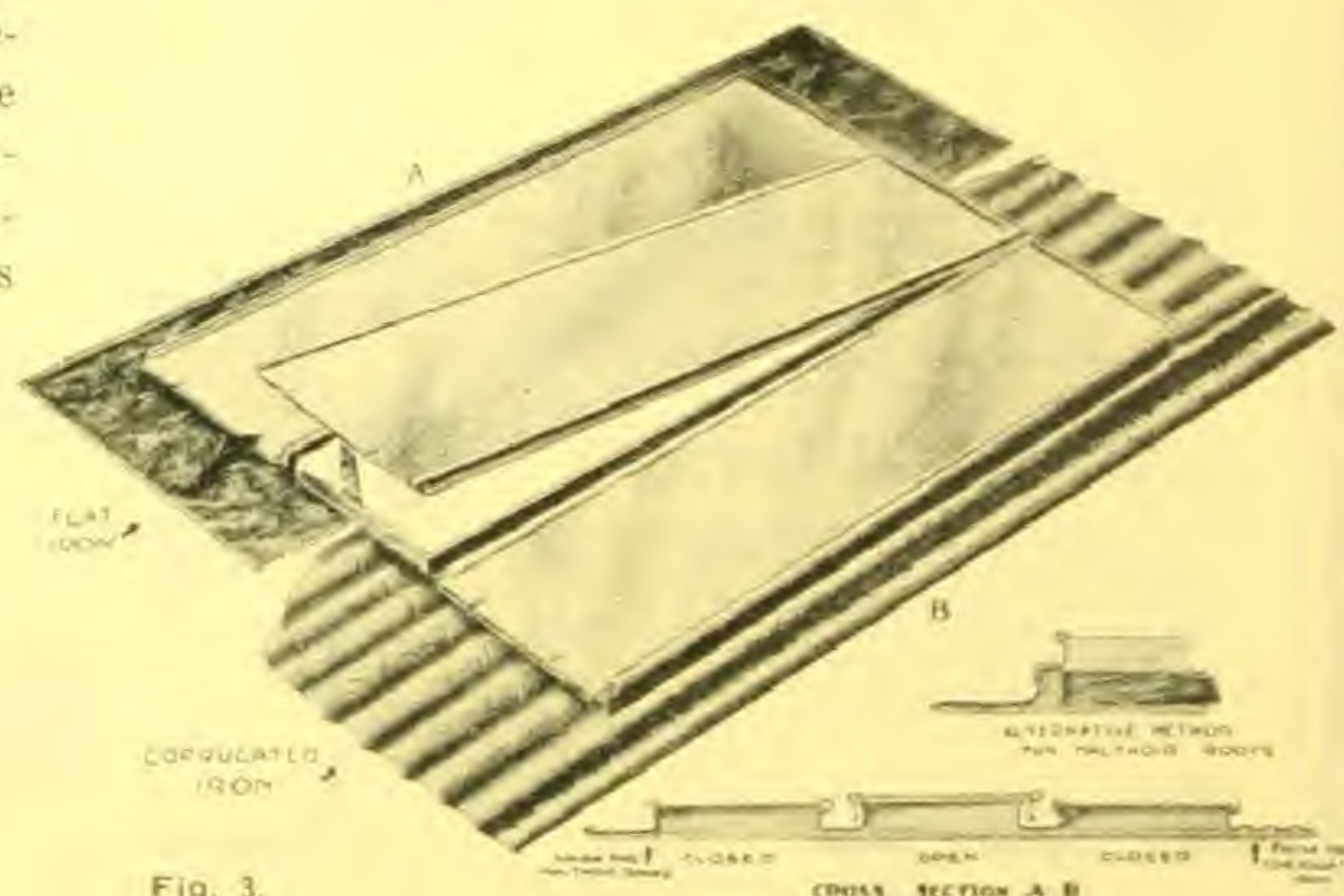


Fig. 3.

## Malleys' Patent Skylights—Multiple Lights (Fixed or Opening Types)

The illustration here shows a treble light, which can be had in either plain or corrugated iron. The sections show very clearly the construction, also simple details for fixing on either corrugated iron or malthoid roofs.



## MALLEYS' SKYLIGHTS MEAN FRESH AIR, LIGHT AND HEALTH

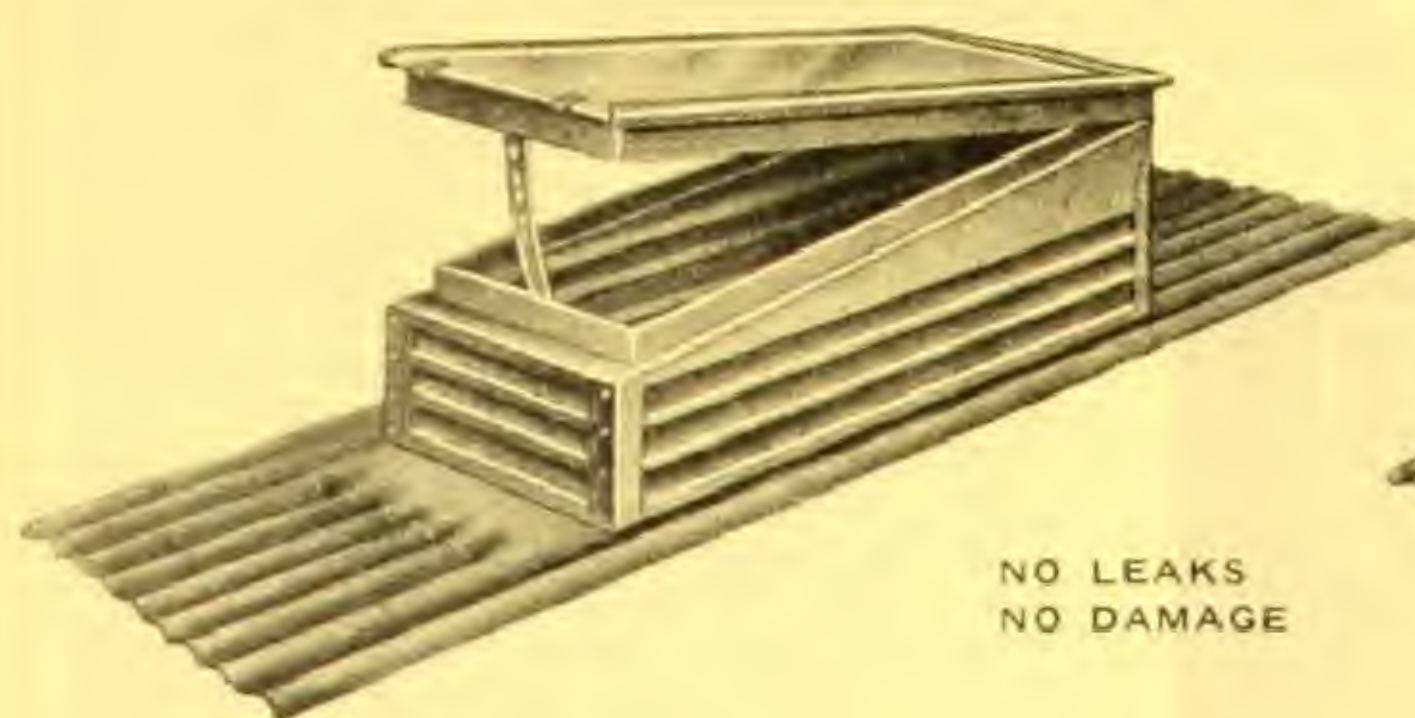
MADE FOR EVERY ROOF  
UNDER THE SUN

Fig. 4.

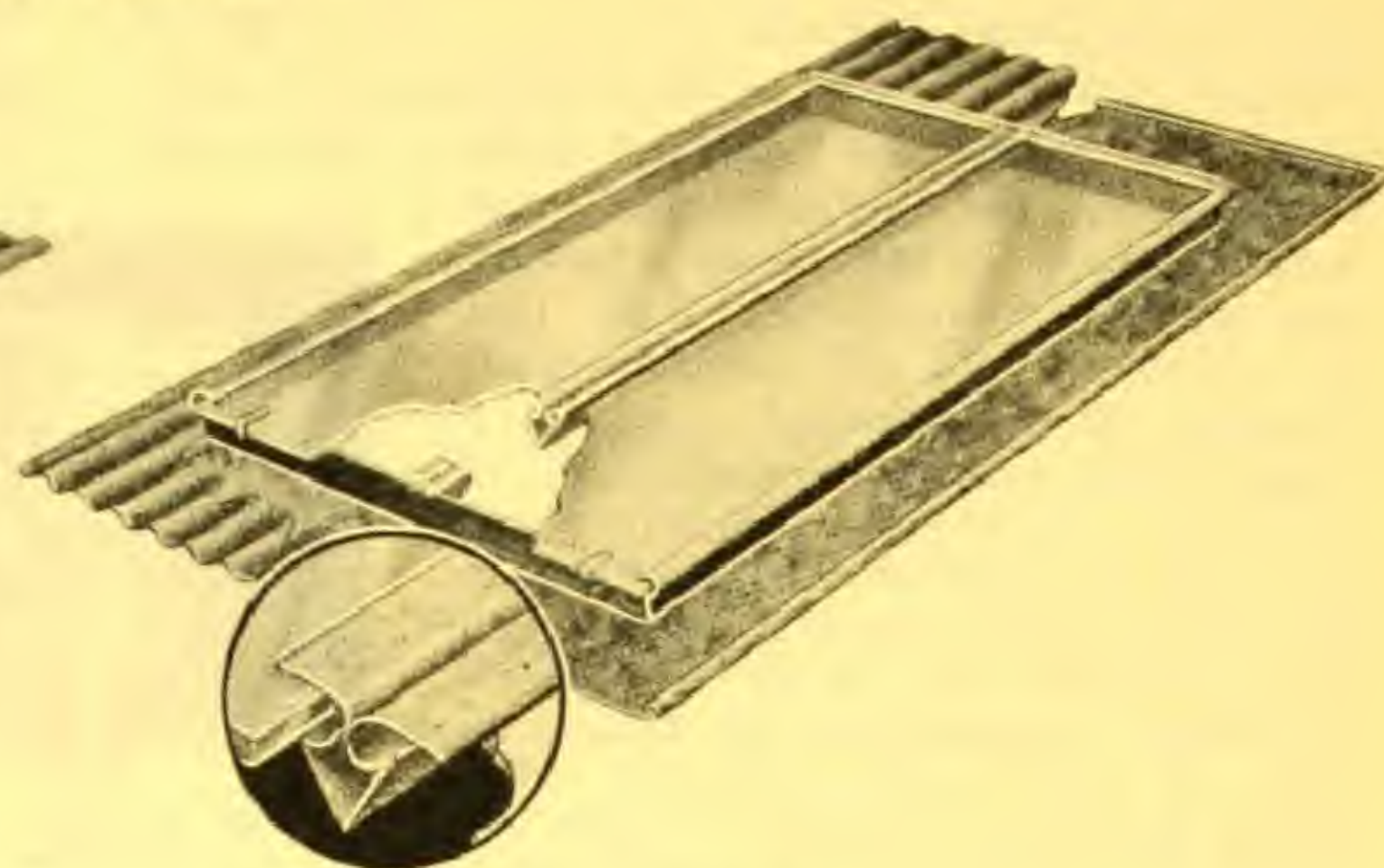


Fig. 5.

**Malleys' Ventilated Skylights (Fixed or Open Type)**

Made, as illustrated, in stock sizes or to any desired length and width. A very popular type for factories and warehouses. Used extensively throughout the State.

Malleys' skylights are without doubt the strongest and most secure skylights manufactured. Install them on your buildings and get the full benefits of natural lighting and natural ventilation.

**Malleys' Double Skylights for Flat and Corrugated Roofs**

The inset in Fig. 5 shows Malleys' Shadowless Glazing Bar, a special feature in Malleys' skylights for the lighting of glass houses, studios and buildings where every particle of natural light is required.

Please Note.—Malleys' Patent Skylights are made of flat iron for tile, slate, fibro or flat roofs (mention composition of your roof when ordering).

**MALLEYS' GALVANISED IRON VENTILATORS****Advantages**

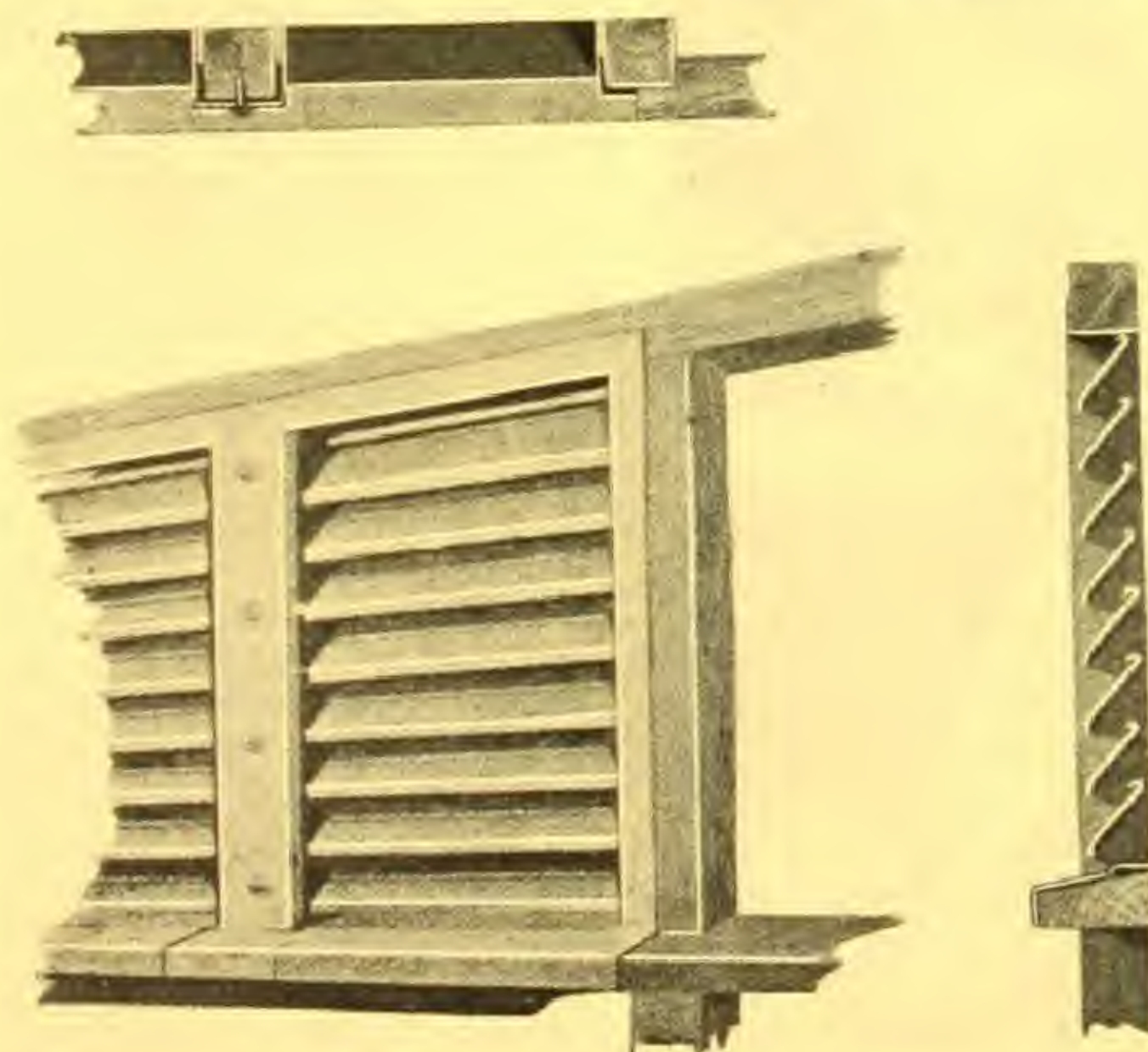
These ventilators are most practical and far in advance of the old style glass vents. Made for any sized opening, or to special detail. As compared with the old style glass vents, they are stronger, easier to fix, cheaper, unbreakable, and far more weatherproof.

**Construction Features**

The galvanised iron frame is of great rigidity, the louvres being of double-lipped section, as shown in sectional view, which not only imparts great rigidity to the whole ventilator, but also prevents driving rain from entering the building. The frame forms a flashing on the sill and frame, as indicated in the sectional plan.

Fixing is easy, the ventilator is simply set into the opening, which has been framed up for it and screwed to the vertical members.

Louvres made adjustable or fixed as required.



Showing Ventilator Built In.



## "SUNRISE" ROOF VENTILATORS (PAT. APP. 931/31) (STORMPROOF)

### The Ventilation Problem

The successful ventilation of industrial and commercial buildings depends directly on the achievement of correct answers to these fundamental questions: How many roof ventilators will be needed to ventilate the building effectively and economically? What should be the size of these ventilators? Just how and where should the ventilators be installed for best results?

Equipped with an installation of "Sunrise" Ventilators, a building will be ventilated with maximum efficiency and at the lowest cost obtainable with such efficiency, for every "Sunrise" Ventilator installation is based on facts. A scientifically designed wind tunnel has been installed to test the "Sunrise" Ventilator, thus guesswork and rough estimates are eliminated.

### The Need of Ventilation

The importance of properly ventilating buildings is well recognised by those responsible for greater efficiency and production in commercial and industrial undertakings.

A properly-ventilated room increases the mental and physical efficiency of the worker to a remarkable degree, and the output of manual workers has increased upwards of 33 1-3 per cent. as a result of improved methods of ventilation.

For many purposes natural draught ventilation is more suitable than artificial ventilation, a better distribution is often obtained and the initial cost of installing is, as a rule, considerably less. There are no running costs, and the use of the "Sunrise" Positive Ventilating Cowl will ensure the requisite minimum number of changes of air per hour.

#### OPERATION OF "SUNRISE" VENTILATORS

We have been manufacturing automatic natural draught ventilators for 30 years and our ventilators are tested in our practically-designed wind tunnel with the most improved scientific instruments, with the result that we are able to furnish actual exhausting capacity data with the "Sunrise" Natural Draught Ventilator. The "Sunrise" Ventilator is designed to make use of either, or both, of the two distinct natural forces that are available to produce air currents. These forces are stack or thermal action and wind action.



The "Sunrise" Roof Ventilator.

Stack action occurs when air in a stack is heated above the temperature of the surrounding atmosphere; this action is independent of wind velocity and ceases when the temperatures inside and outside of the stack are equalised.

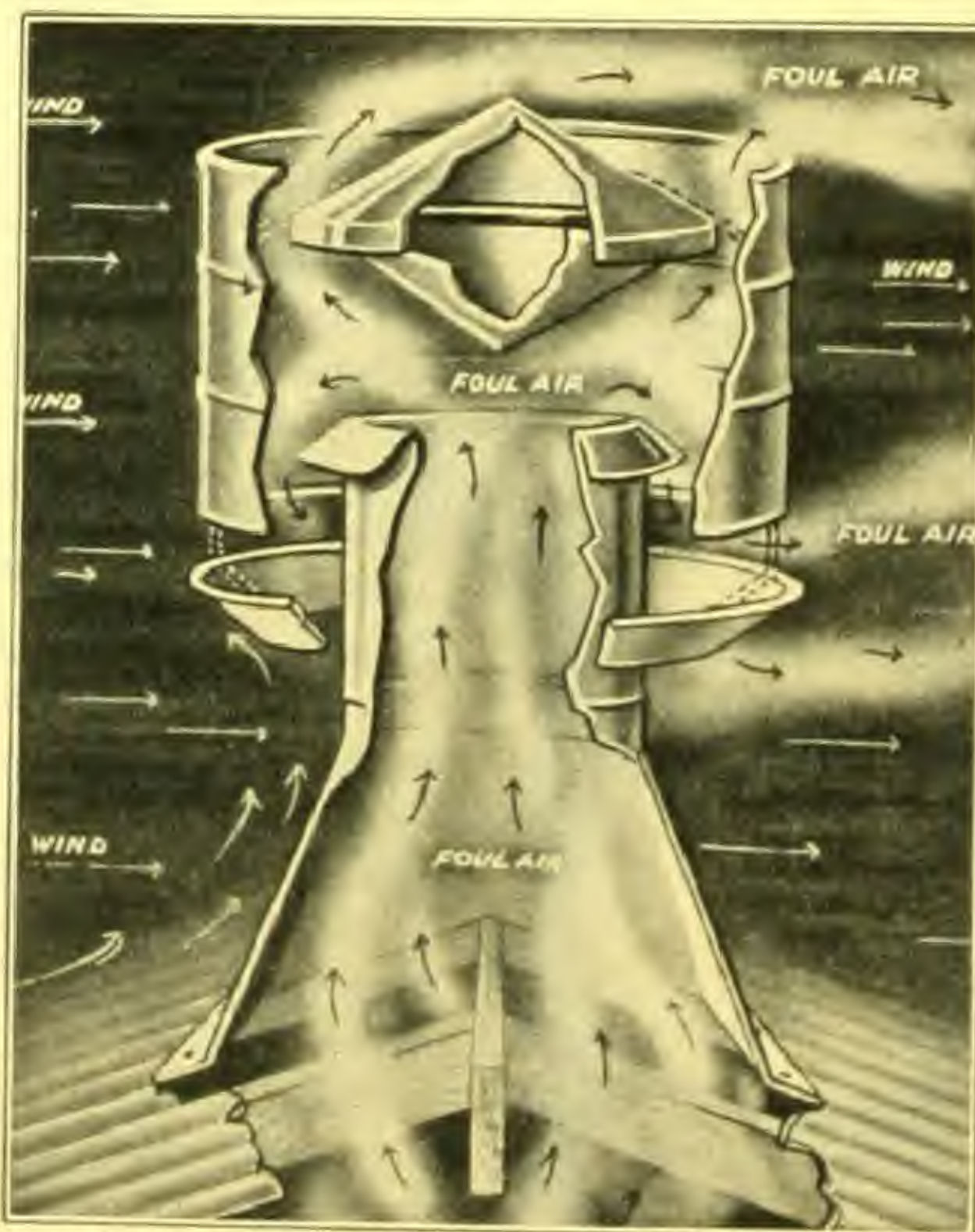
The stack action is proportional to the height of the building, being greater in tall buildings; and is also proportional to the temperature difference, being greater at high temperatures. Wind action is the effect of passing winds blowing across the top and bottom of the suction band, creating a suction in the ventilation pipe, resulting in a strong upward air exhausting movement proportional to the velocity of the wind.

The design of the "Sunrise" Ventilator combines the greatest possible draught with the least possible resistance to air flow and ensures a plentiful supply of fresh air. The action at low wind velocities may be independent of temperature differences, and the ventilator is always on duty; the air in the buildings is "fresh" to commence the day, and the freshness is maintained at all times.

Fresh air openings should be arranged in the sides of buildings in the form of opening windows or doors and should have an area of at least twice the area of the cowls. These openings can be partly or altogether closed when restricted ventilation is required, or dampers may be fitted in the ventilator pipes when specially ordered.

Automatic dampers with fusible links (which close the ventilator when a fire starts, thus cutting off the draught) will be fitted to "Sunrise" Ventilators when specially ordered. "Sunrise" Rectangular Ventilating Cowls can be supplied to meet special requirements and to harmonise with architectural designs of buildings. We are equipped to manufacture cowls up to 10 ft. diameter or larger equivalent rectangular sizes.

The table of exhausting capacities of the "Sunrise" Ventilators is based upon tests on commercial cowls under service conditions.



\* Operating Principles of "Sunrise" Ventilators.  
Patent app. 931/31.

### Moisture Removal

In the ventilation of steam process rooms, the number of changes of air per hour will be based on the amount of steam to be carried away by the air. The moisture carrying effect of the air is shown in the following table:—

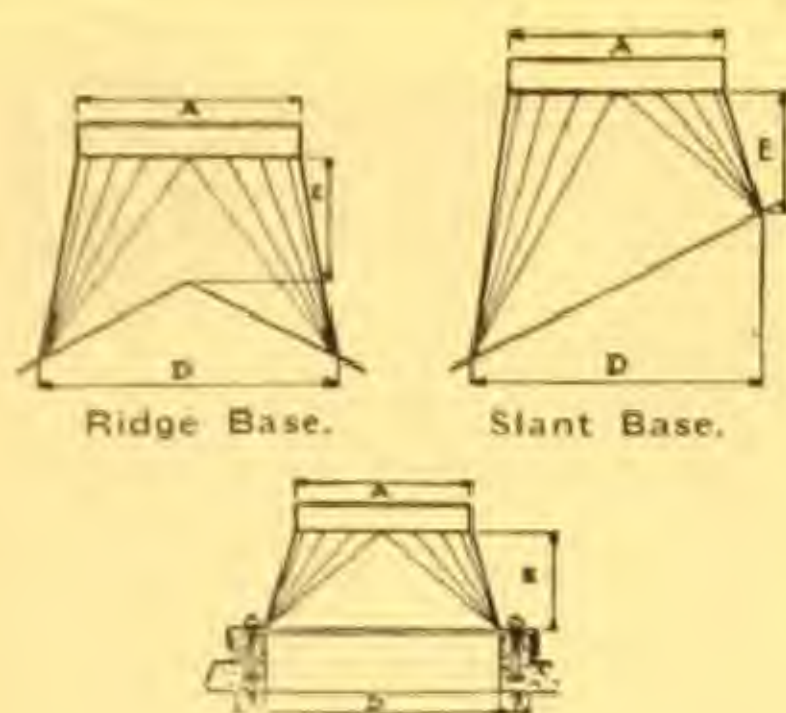
STEAM CARRYING CAPACITY  
OF AIR AT VARIOUS  
TEMPERATURES.

Air Temp. Fabr.	40	51	60	72	82	89	95
Lbs. Steam per 1,000 cu. ft. air	1	2	3	4	5	6	7

Thus, for a 10 deg. rise in temperature the increased moisture carrying capacity of air is approximately 1 lb. per 1,000 cubic feet, in other words, 2,000 cubic feet of air will satisfactorily remove one pound of water vapour or steam. The standard finish of the "Sunrise" Ventilator is "Galvanized." Where required for a steamy atmosphere, Ventilators will be coated with our special corrosion resistant, or made of non-corrosive materials when specially ordered. Bird wire will be fitted when specially ordered.

(Continued on next page)

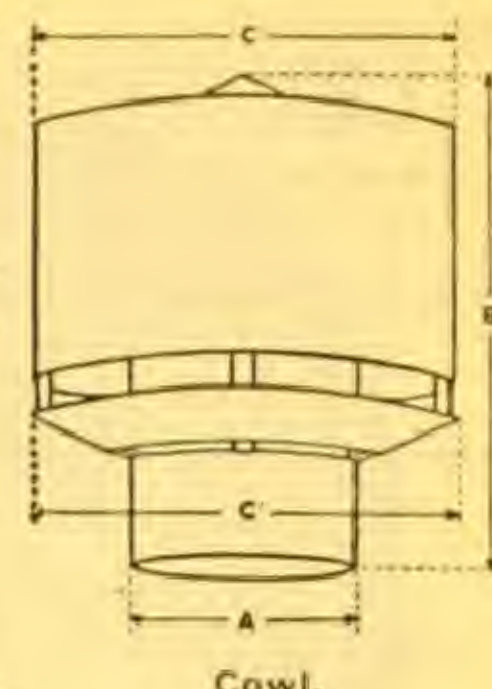




Flat Base.

DIMENSIONS OF "SUNRISE" COWLS AND BASES

COWLS				BASES		
Shaft A	B	C	C	Shaft A	D	E
inches	inches	inches	inches	inches		inches
9	16½	17	18	9	12 in. x 12 in.	10
12	22½	22½	24	12	16 in. x 16 in.	10
15	28½	28½	30	15	20 in. x 20 in.	10
18	32½	34	36	18	24 in. x 24 in.	10
20	38½	37½	40	20	28 in. x 28 in.	10
24	45	45½	48	24	32 in. x 32 in.	12
30	55½	57	60	30	38 in. x 38 in.	14
36	67½	67½	72	36	45 in. x 45 in.	16



Cowl.

TABLE OF EXHAUST CAPACITIES OF "SUNRISE" VENTILATORS GUARANTEED

Inside Excess Temperature.	Wind Velocity, Miles per Hour.	Height of Ventilator above Intake, viz., Doors, Windows, etc., Feet	Cubic Feet per Minute.							
			Sizes of Ventilators in Inches—Diameter Shaft.							
			9 in.	12 in.	15 in.	18 in.	20 in.	24 in.	30 in.	36 in.
0°	2	10	28	50	76	110	160	200	305	440
	4	20	56	100	127	225	315	400	610	880
	6	30	85	150	230	335	475	600	920	1,350
	8	40	118	210	305	460	640	830	1,220	1,800
	10	50	148	265	383	570	800	1,060	1,530	2,300
5°	2	10	63	110	170	250	355	440	680	990
	4	20	76	135	209	305	435	540	835	1,215
	6	30	89	155	240	350	500	620	960	1,390
	8	40	95	170	265	385	550	680	1,060	1,530
	10	50	104	185	288	415	600	745	1,150	1,660
10°	2	10	90	160	246	360	510	635	985	1,420
	4	20	104	185	285	415	590	735	1,140	1,640
	6	30	119	210	315	460	655	820	1,260	1,850
	8	40	126	225	340	500	710	890	1,360	1,980
	10	50	135	240	382	540	760	940	1,450	2,130
15°	2	10	115	205	322	465	670	825	1,290	1,860
	4	20	129	230	360	520	750	925	1,440	2,080
	6	30	146	250	390	570	815	1,010	1,560	2,260
	8	40	153	270	420	610	870	1,070	1,670	2,400
	10	50	160	285	440	640	920	1,130	1,750	2,550
20°	2	10	146	260	400	580	835	1,030	1,600	2,340
	4	20	158	280	440	630	920	1,130	1,750	2,520
	6	30	175	310	470	690	990	1,220	1,875	2,750
	8	40	180	320	500	720	1,040	1,280	2,000	2,850
	10	50	191	340	540	760	1,100	1,350	2,150	3,000
25°	2	10	180	320	475	720	1,000	1,280	1,900	2,880
	4	20	195	346	525	760	1,100	1,380	2,100	3,110
	6	30	205	360	562	810	1,175	1,440	2,250	3,220
	8	40	214	380	600	850	1,250	1,520	2,400	3,420
	10	50	225	400	640	900	1,300	1,600	2,550	3,560
30°	2	10	76	135	210	305	435	540	840	1,210
	4	20	95	170	265	380	550	680	1,060	1,530
	6	30	115	200	308	450	640	800	1,230	1,800
	8	40	124	220	343	495	715	880	1,370	1,980
	10	50	135	240	375	540	780	960	1,500	2,160
35°	2	10	104	185	285	415	590	740	1,140	1,650
	4	20	124	220	340	495	710	880	1,360	1,970
	6	30	140	250	385	560	800	1,000	1,540	2,250
	8	40	155	270	423	610	880	1,080	1,690	2,430
	10	50	162	290	457	650	940	1,160	1,830	2,620
40°	2	10	95	170	264	380	550	680	1,055	1,530
	4	20	124	220	342	495	715	880	1,370	1,980
	6	30	146	260	403	585	840	1,040	1,610	2,340
	8	40	162	290	452	655	940	1,160	1,810	2,620
	10	50	180	320	500	720	1,030	1,280	2,000	2,880
45°	2	10	124	220	340	495	710	880	1,360	1,970
	4	20	152	270	420	610	875	1,080	1,670	2,430
	6	30	174	310	480	695	1,000	1,240	1,910	2,770
	8	40	191	340	530	750	1,070	1,360	2,120	3,060
	10	50	210	370	575	840	1,200	1,480	2,300	3,300

**"SUNRISE" VENTILATION BASES**

Bases can be furnished with "Sunrise" Ventilators to meet the requirements of any kind of roof. The three types diagrammed above are most commonly used. Types Nos. 1 and 2 are made to fit roofs of any slope. Type 3 is made to fit over wood, concrete, or other curbs; when ordering, give size of opening and curb thickness.

**Selection of Ventilators**

The table of exhaust capacities has been based on tests carried out in our large wind tunnel and cover the range of conditions usually met with in Australia.

In selecting suitable sizes of "Sunrise" Cows it is necessary to know the quantity of air to be exhausted and the conditions under which the cowl is required to work, such as the height of the ventilator above the fresh air intakes and the permissible excess of temperature inside above that of the outside air and the allowable wind velocity, and with these values a reference to the table will indicate at a glance the size of the required unit ventilator.

**For Example:**—A building 100 ft. x 100 ft. x 20 ft. high requires the air changing twice per hour; select a suitable unit ventilator.

The bays of the building may be taken as 25 ft. x 25 ft., and it would be suitable to fit ventilators at centre of such bays, thus the number of ventilators would be—

$$100 \text{ divided by } 25 = 4 \times 4 = 16$$

The cubical contents of the building is  $100 \times 100 \times 20 = 200,000$  cubic feet, and the air requires changing twice each hour, the volume of air to be exhausted equals  $200,000 \times 2 = 400,000$  cubic feet per hour, or 6,666 cubic feet per minute.

The quantity of air per ventilator equals 6,666 divided by 16 = 416 cubic feet per minute.

The permissible temperature rise is to be approximately 10 degrees, and the height from inlet to cowl is 20 feet, and allowable wind two miles per hour, and under these headings the table gives an output of 380 cubic feet for an 18 in. and 555 cubic feet for a 20 in. ventilating cowl, and for this building, 16-18 in. ventilating cowls could be used, with a temperature rise of 11 degrees.

It is necessary to check if the calculated air movement will carry off the steam emitted from boiling pans in this building, quantity 50 pounds per hour, with a 10 degree rise, 50 lb. of steam can be handled by 100,000 cubic feet per hour and the air movement allowed:—100,000 cubic feet per hour will very easily carry away the 50 lb. of steam.



S.A.A. File No.

# WUNDERLICH LIMITED

Manufacturers of

## Architectural Metalwork

Administration: BAPTIST STREET, REDFERN, SYDNEY, N.S.W.

Showrooms and Offices:

SYDNEY: Baptist Street, Redfern.  
 STH. MELBOURNE: 210 Hanna Street.  
 ADELAIDE: Grote and Morphett Streets.  
 PERTH: Lord and Short Streets.

BRISBANE: Amelia Street, Valley.  
 NEWCASTLE: Builders' Exchange, King St.  
 HOBART: 139 Macquarie Street.  
 LAUNCESTON: 71 St. John Street.



[For Other Products, See Pages 22, 55, 93, 176 and 240]

### Products

This classification includes a wide range of products for architectural purposes, and for use in the building industry. It comprises both stock materials and the vast variety of decorative products executed to the designs of architects or our own artists.

### Stock Manufactures

Metal Letters, in Zinc, Bronze or Copper.  
 Bronze Letters, with vitreous enamel filling.  
 Drawn Metal Mouldings on wooden cores.  
 Metal Ventilators and Grilles.  
 Bronze Tablets, Badges and Nameplates.  
 Plain and Decorated Coats of Arms.  
 Metal Statuary and Fountains.  
 Steel Skirtings, Architraves and Rails.  
 Steel Doors and Trim.  
 Awning Fascias, Crestings and Enrichments.  
 Bronze Mail Boxes and Letter Chutes.

### Special Manufactures

General Architectural Bronzework, comprising work in Bronze, Copper, Brass, Nickel-silver, and Zinc, with natural or polished finish, or oxidised as desired, including also bronzework decorated with vitreous enamels—available in a wide range of imperishable colours. The products include:—

Metal Roll-cap and Interlocking Roofing.  
 Metal Parapet Cornices; Awning Fascias.  
 Bronze Treatment to Entrances; Bronze Doors.  
 Metal Spandrels under windows; Statuary Groups.  
 Bank Fittings, Desks and Stools; Bank Grilles.  
 Kicking Plates; Metal Railings; Counter Screens.  
 Monumental Bronzework; Memorial Tablets.  
 Commercial Nameplates; Directory Tablets.  
 Ecclesiastical Bronzework; Altar Rails.  
 Lecterns; Altar Gates; Communion Plates.  
 Urns and Vases; Lamp Standards and Brackets.

### Experience and Facilities

Since its establishment in 1887, this Wunderlich Industry has carried out successfully the most intricate undertakings of this nature, some of them of considerable magnitude, in every Australian State. Up-to-date Plants for the purpose, and a staff of trained craftsmen, are located in every Capital (see addresses above).

### Designs and Estimates

Estimates will be furnished on receipt of drawings of the projected work. If desired, sketch designs will be prepared, free of charge, by the Wunderlich staff of experienced artists.

### Printed Literature

Catalogues, Pamphlets and other literature relating to Wunderlich Architectural Metalwork will be sent post-free on request.

### Some Works Completed Recently

Bronze Desks, Tables, Stools and Screens in the Banking Chamber; Bronze Spandrels and Pediments to three elevations—Government Savings Bank of N.S.W.; Head Office, Sydney.  
 Bronze Desks, Tables, Tellers' Boxes, Counter Screens; Entrance Doors and Screens; Mail Boxes and Letter Chute—Bank of N.S.W.; Head Office, Sydney.  
 Bronze Urn, Tablets, Cresting and Letters, decorated with Enamels—Queensland War Memorial, Brisbane.  
 Bronze and Enamel Roll of Honour Tablets—"The Sun" Office, Sydney.  
 Bronze Spandrels, Pediments, Lamp Standards and Brackets—The City Hall, Brisbane.  
 Bronze Doors and Treatment to Doorway; Spandrels, Cornice and Lettering, and Bronze Mail Box—The Atlas Building, Perth.  
 Synagogue Copper Domes at St. Kilda Road and at East St. Kilda, Melbourne.  
 A.P.A. Dome; Cupolas at R.C. Churches at Middle Park, Elwood, St. Kilda, Burke Road, Camberwell; Spires at St. George's Church, Fitzroy; Convent at Oakleigh, Melbourne.



Wunderlich Copper Roofing to Domes, Flinders Street Railway Station, Melbourne.

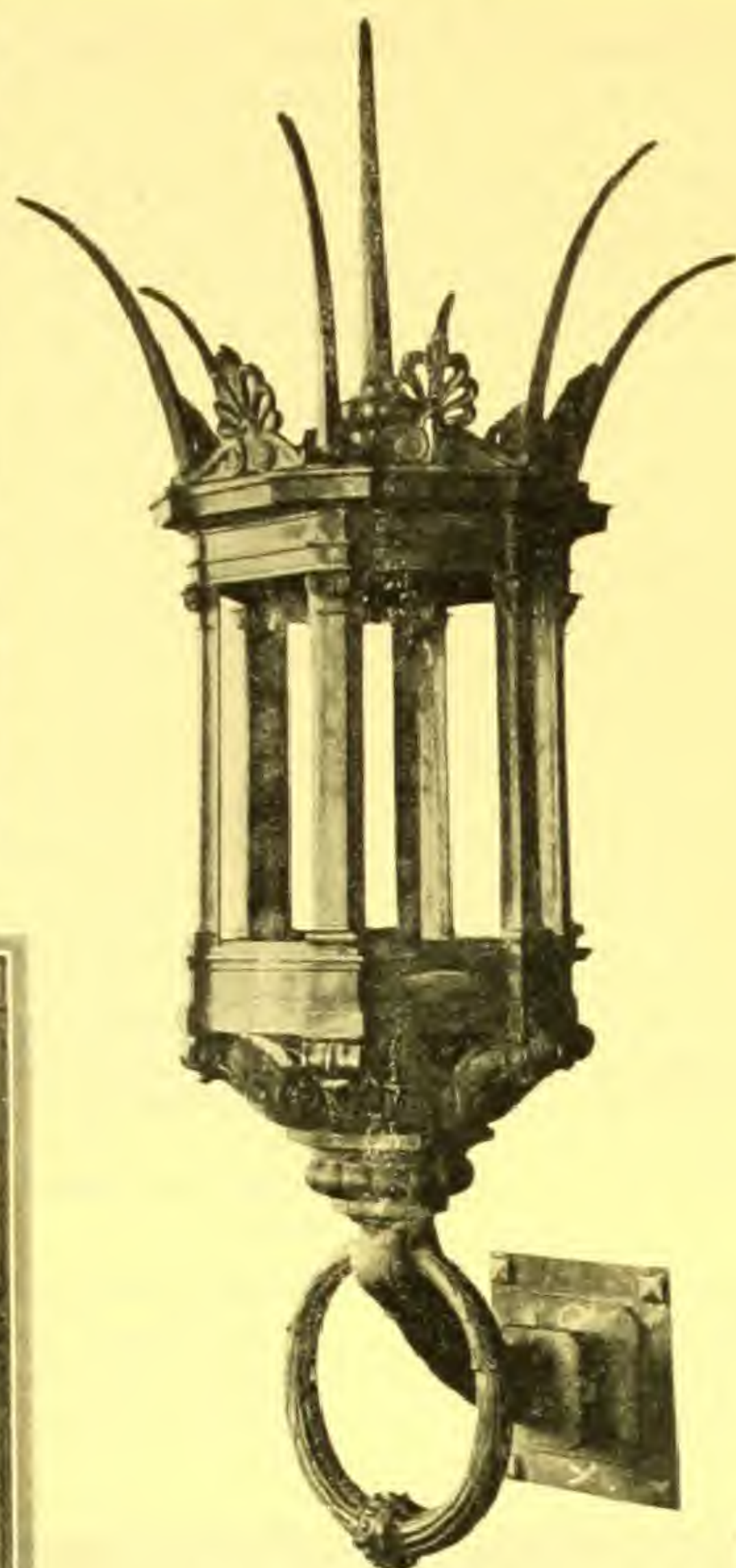




Bronze Doors, Commonwealth Bank,  
Sydney.



Roll of Honour Tablet, The Great  
Synagogue, Sydney.



Bronze Lamp, The City Hall,  
Brisbane.



Swing Doors of Bronze, State  
Theatre, Sydney.



Copper Marquee, Farmer and  
Co. Ltd., Sydney.



Copper Spandrels and Mullions,  
Dymock's Building, Sydney.



Copper Fleche, The University,  
Sydney.

EXAMPLES OF WUNDERLICH ARCHITECTURAL METALWORK

(See next Page for Metal Ceilings)

RAMSAY'S CATALOGUE



# WUNDERLICH LIMITED

Manufacturers of

## Wunderlich Metal Ceilings

Administration: BAPTIST STREET, REDFERN, SYDNEY, N.S.W.

Showrooms and Offices:

SYDNEY: Baptist Street, Redfern.  
 STH. MELBOURNE: 210 Hanna Street.  
 ADELAIDE: Grote and Morphett Streets.  
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BRISBANE: Amelia Street, Valley.  
 NEWCASTLE: Builders' Exchange, King St.  
 HOBART: 139 Macquarie Street.  
 LAUNCESTON: 71 St. John Street.



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S.A.A. File No.

[For Other Products, See Pages 22, 55, 93, 176 and 240]

### Stock Designs

Wunderlich Metal Ceilings are manufactured in paint-primed Steel, in a wide variety of designs, comprising Panellings, Diaper patterns, deeply coffered Panels, Borders, Cornices, Mouldings, Soffits and Centre Flowers; also complete ceiling treatments in period design. A selection of these designs is available also in unpainted Galvanised Steel.

### Wunderlich Metal Wall Linings

In addition, there is offered a liberal range of patterns for Interior Wall Linings, including Sheetings, Dado Panels, Mouldings, Architraves, Rails and Friezes.

### Special Ceilings

Ceilings in Steel, Zinc, Copper or Bronze, to architects' drawings or to designs by Wunderlich artists, are specially manufactured as required.

### Stock Sizes

Ceiling and Wall Lining designs are made in Sheets measuring 6 ft. by 2 ft. or 6 ft. by 3 ft.; deeply embossed patterns, in Panels 2 ft. by 2 ft.; and Cornices, Mouldings, etc., in 6 ft. lengths.

### Light Weight

Weighing somewhat less than 5 lbs. to the square yard, Wunderlich Metal Ceilings can be installed with safety in buildings of all types.

### Qualities and Advantages

The Wunderlich Designs are varied in range, and of high artistic quality. Being of embossed Metal, the material transports compactly, without risk of damage; and ordinary tradesmen can erect it. All joints consist of tightly-fitting lapped beads, which obviate the use of cover mouldings and offer no refuge for dust or vermin. Once erected, the Ceilings cannot crack, warp, sag, flake, rot or fall down. They are SAFE always—and a highly efficient fire retardant.

### Method of Fixing

Wunderlich Metal Ceilings should be applied to close boarding or—the more usual method—to wooden battens not less than 1½ ins. by 1 in., spaced at 12-in. centres; with cross battens cut in where necessary to provide fixing for the ends of Ceiling Sheets. The Metal material should be secured to battens, with ½-in. by 16 gauge flat-head galvanised nails.

### Easily Applied over Plaster

Being comparatively light in weight, Wunderlich Metal Ceiling are particularly suitable for installation over cracked or faulty plaster ceilings. This work can be carried out cleanly and tidily; often with no disturbance of the existing ceiling.

### Painting and Decorating

Oils Paints only should be used on Wunderlich Metal Ceilings. Although costing more than water paints, they retain their appearance and quality much longer, and afford the metal surface maximum protection.

### Designs and Estimates

On request, sketch designs or working drawings, together with estimates, will be furnished—for work of any magnitude.

### "Fixing" Service

In each State we maintain a staff of competent Wunderlich Ceiling "Fixers," so we are able to undertake the complete installation of Ceilings.

### Experience

The Industry came into existence in the year 1888, when Wunderlich Ceilings were erected in the Sydney Town Hall—the area comprising 2,500 square yards. This ceiling is intact to-day, showing no sign of wear and tear; as good as when erected.

### Catalogues

Copies of Wunderlich Catalogues, price-lists and other printed literature will be supplied on request.

### Ceilings Installed Recently

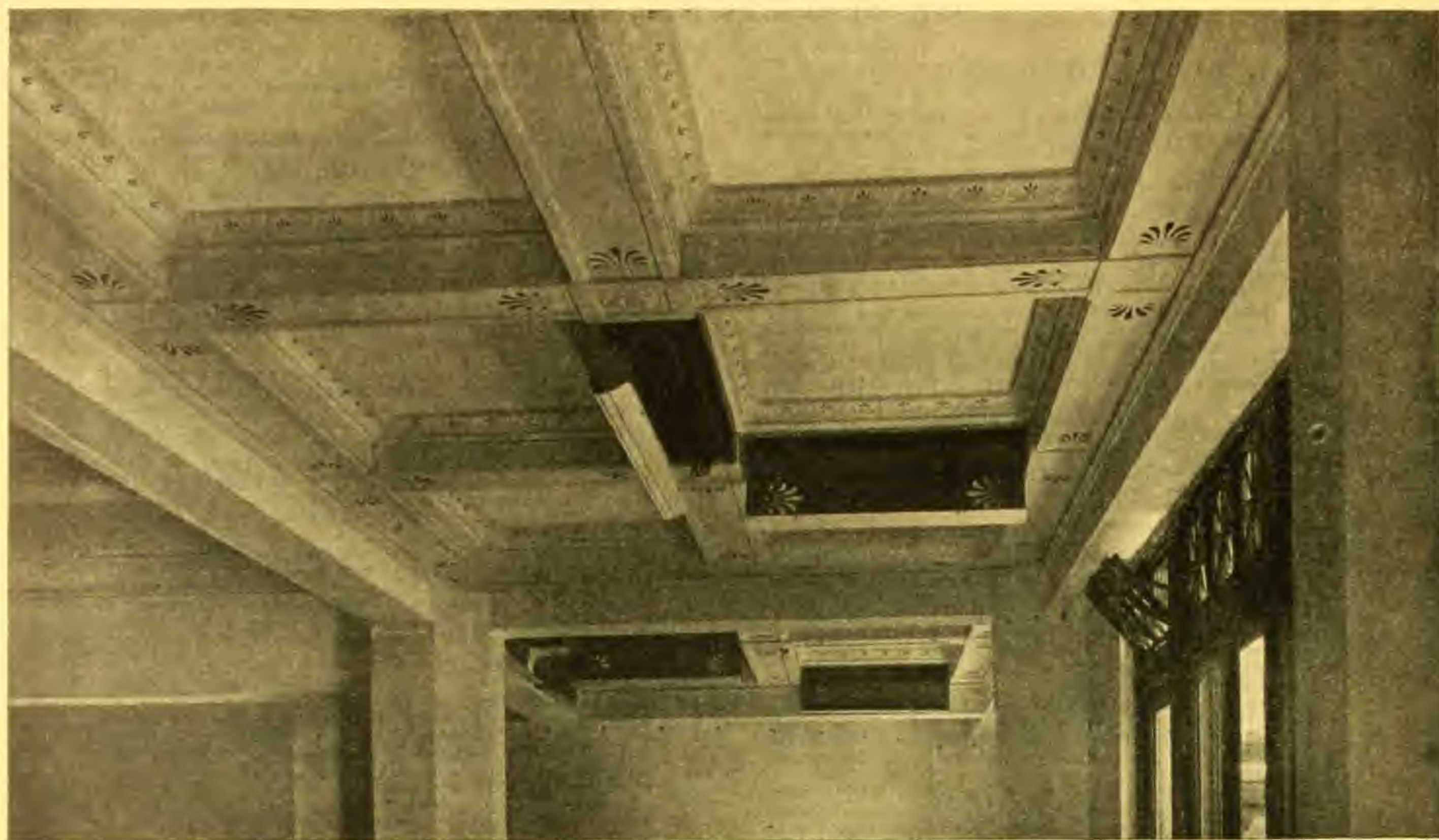
The most important Wunderlich Ceiling Treatments carried out recently are those to the Head Offices of the Government Savings Bank of N.S.W. and the Bank of N.S.W.; both in Sydney. These comprise immense areas of classic treatment, reproduced in painted and Galvanized Steel and Zinc.

(Continued on next page)



Ceiling Treatment, with Wunderlich stock patterns, to an awning.





Wunderlich Hinged Mock Beams, in Steel — Government Savings Bank of N.S.W., Sydney

### Metal Ceilings Fulfil a New Function

A Wunderlich Ceiling Treatment of particular interest to architects designing city buildings is that to the Head Office of the Government Savings Bank of N.S.W., where Mock Beams of Steel and Zinc, HINGED to open, have been installed on nine floors. Secreted in the Mock Beams is the piping carrying various services, and the hinged metalwork provides ready access to this, at the same time fulfilling all demands from the viewpoint of artistic effect.

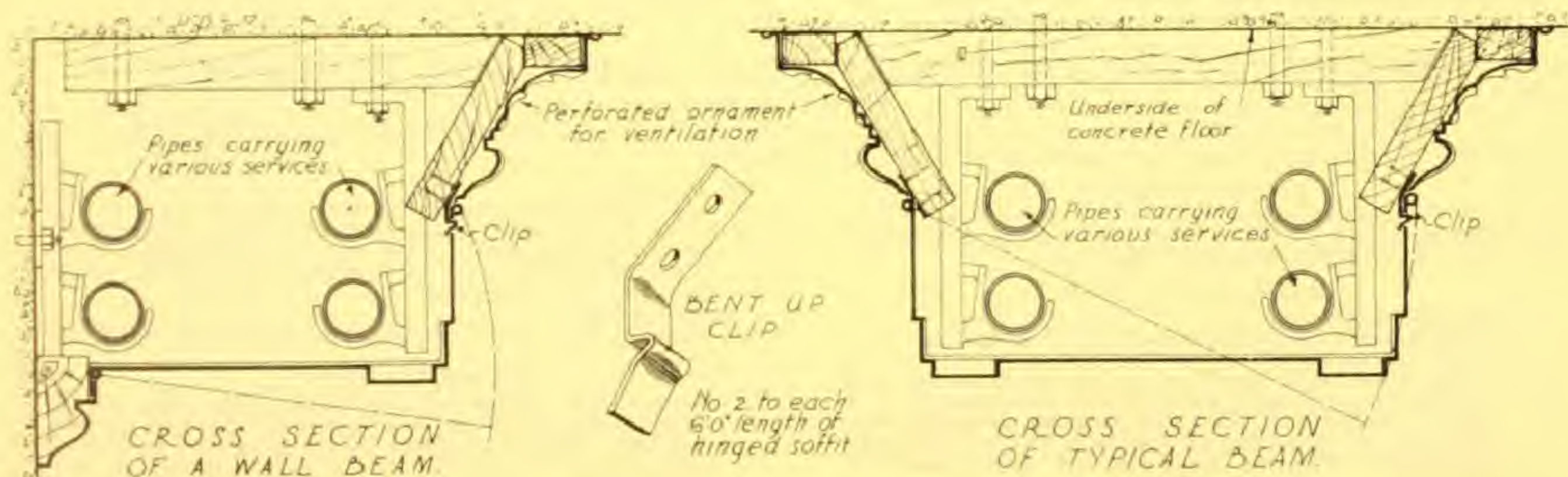
In the above illustration, six sections of metal casing are shown in the "open" position. It will be seen that if repairs, alterations or extensions of the pneumatic system or the heating and electricity services become necessary, immediate access to the tubes and piping is obtained by the opening of the Mock Beams.

This scheme marks a distinct advance on the usual system of carrying these services in the concrete floors, and has become practicable only through the employ-

ment of Metal for the hinged casing. Brittle and organic materials would not withstand the severe treatment to which the metal work will be subjected over a period of years.

The sectional drawings printed below explain the construction adopted. Each section of steel casing, comprising the soffit and fascias, is stamped in one piece, and strengthened with a reinforcement of strip steel, attached transversely at regular intervals. One edge of the casing is hinged and fixed along the bottom member of the cornice. The other edge, strengthened with a rolled finish, is slotted at intervals, so that with the casing in a closed position, the slots spring over projecting nibs in special clips fixed below the cornice. A small lug at each end of the steel casing facilitates handling during the closing and opening operations.

It is apparent that the hinged casings not only fulfil successfully their practical function, but also form a pleasing and interesting feature of the interior treatment of the Bank.





# SPECIFICATION FOR THE SUPPLY, FABRICATION AND ERECTION OF STRUCTURAL STEEL

(Continued from opposite page)

## SECTION 3—FABRICATION

- (a) **INSPECTION**  
The Architect (Engineer) or his agent shall have full access at all reasonable hours to the shop where the work for the structure is under fabrication.
- (b) **REJECTION**  
Materials or workmanship not conforming to the provisions of this Specification shall be rejected at any time defects are found during the progress of the work. The Sub-Contractor furnishing such materials or doing such work shall promptly replace the same.
- (c) **RIVET HOLES**  
If reamed or drilled holes are not specifically agreed to (see alternate clause below) the diameter of the punch shall be  $\frac{1}{16}$ th inch larger than the nominal diameter of the rivet, and the die opening  $\frac{1}{8}$  inch larger than the diameter of the punch. The thickness of the material in punched work shall not be greater than the nominal diameter of the rivet plus  $\frac{1}{8}$  inch. Punching shall be accurately done. When the work is assembled all holes which will not admit a rod  $\frac{1}{8}$  inch smaller than the nominal diameter of the cold rivet shall be reamed.
- (c) **RIVET HOLES (Optional Clause)**  
All rivet holes shall be sub-punched and reamed; the die used for punching shall be of  $\frac{1}{16}$ th inch smaller than the nominal diameter of the rivet and the assembled holes shall be reamed to a diameter of  $\frac{1}{16}$ th inch larger than the nominal diameter of the rivet.  
(When the metal is thicker than the Diameter of the rivet plus  $\frac{1}{8}$  inch, the holes should be drilled, or sub-punched and reamed.)
- (d) **PLANING**  
Unless particularly indicated on the drawings, no planing of sheared edges need be done. All rough edges or burrs resulting from planing or drilling and all outer sharp arrises of holes are to be removed.
- (e) **ASSEMBLING**  
Riveted members shall have all parts well pinned up and firmly drawn together with bolts and rigidly held together while riveting. Drifting to enlarge unfair holes shall not be allowed. Poor matching of holes will be the cause for rejection.  
All members shall be free from twist or other distortion and open joints.
- (f) **RIVETING**  
Riveting shall be by pressure tools wherever possible.  
Rivets shall be uniformly heated, driven and heads formed while hot; when driven they shall completely fill the holes.  
Finished rivet heads shall be full, neatly made, concentric with the rivet hole and in full contact with the surface of the member. Re-cupping and caulking will not be allowed. Loose, burned and otherwise defective rivets shall be cut out and replaced, care being taken not to injure the adjacent metal.
- (g) **STRAIGHTENING**  
All material before being laid off or worked in any way shall be thoroughly straightened or flattened in the shop by methods that will not injure the metal.
- (h) **BOLTS**  
Bolts, if used, shall be of Whitworth standard threads, with hexagon heads and nuts, the threads fully formed with nuts hand-tight on bolts of such length that the nut is fully engaged when screwed up in the work; washers not less than  $\frac{1}{8}$  inch thick are to be used.  
Where turned bolts are shown upon drawings the holes shall be reamed parallel and the bolts turned to a driving fit. Nuts shall be prevented from turning by chisel cuts on threads.
- (i) **DETAILS OF ASSEMBLY**  
(1) Surfaces in contact shall be cleaned and painted before riveting together.  
(2) Connection angles for girders shall be flush with each other and correct as to position and

length of girders. In case milling is required after riveting, the removal of more than  $\frac{1}{16}$ th inch from their thickness will be cause for rejection.

- (j) **FINISH OF JOINTS**  
Compression joints depending upon contact bearing shall have the bearing surfaces faced at right angles to the length after the members are riveted. All other abutting joints shall be cut or dressed true and straight and fitted closed together, especially where open to view.
- (k) **CASTINGS**  
All castings shall be true to dimensions, free from distortion, cleaned and free from sand or core material. All holes are to be drilled unless coring is specifically allowed and abutting surfaces of metal to metal shall be machined.
- (l) **PAINTING**  
All steel work, except where encased in concrete, shall be thoroughly cleaned and given one good coat of approved protective paint well worked into the joints and open spaces.
- (m) **MARKING**  
Each piece shall be marked plainly with an identification number, together with proper floor mark. The respective erection marks shall be clearly shown on the erection diagram drawings.
- (n) **PACKING**  
Where steel work is to travel by rail or boat to the site it shall, where necessary, be protected as to outstanding ends by timber guard pieces. All rivets and bolts shall be suitably bagged and labelled.

## SECTION 4—ERECTION.

- (a) **SETTING-OUT**  
All setting-out such as centre lines and bearing levels shall be defined by the General Contractor with all care necessary to ensure the whole work coming together into proper position.
- (b) **HOLDING-DOWN BOLTS**  
All holding-down bolts shall be supplied to the General Contractor sufficiently in advance of erection to enable them to be positioned. Templates shall be furnished by the Sub-Contractor where required.
- (c) **COLUMN BASES**  
All grillages and bases or columns with attached bases shall be set and wedged or shimmed by the Sub-Contractor to the level lines set by the General Contractor. The General Contractor shall grout all such parts in place with Portland cement grout, as specified elsewhere.
- (d) **ERECTING**  
The framing of the structural steel shall be carried up true and plumb and temporarily braced where needed.  
All work shall be securely bolted up to take care of all dead loads, wind and other stresses.
- (e) **LOOSE PIECES**  
All loose pieces such as bearing plates for beams and trusses and lintels used to carry brickwork, etc., over openings and which cannot be placed except as the masonry work advances, shall be supplied by the Sub-Contractor, but set by the General Contractor.
- (f) **MINOR MISFITS**  
Correction of minor misfits by the moderate use of drift pins, or by a moderate amount of reaming, slight chipping or cutting, shall be considered as legitimate part of erection. Additional cutting of sections shall not be done by the Sub-Contractor except by consent of the Architect (Engineer).
- (g) **FIELD RIVETING**  
No riveting shall be done until the structure has been properly aligned. After reaming, all rough burrs shall be removed. Rivets shall be heated uniformly and driven with the same care as during fabrication.  
All other details of riveting shall be in accordance with that specified above.

# SPECIFICATION OF STRUCTURAL STEEL FOR BUILDINGS

(SHORT FORM)

NOTE.—This brief Specification is prepared for use in connection with the design and construction of minor works or where a short but consistent specification is desired.

## 1—MATERIALS.

All structural steel shall be of Australian manufacture and shall conform to the Australian Standard Specification for Structural Steel.

## 2—FABRICATION.

- (a) **WORKMANSHIP**  
Fabrication shall be carried out by a firm approved of by the Architect.  
The steel work shall be, as far as possible, shop fabricated. All parts forming the structure shall be built in accordance with the detailed drawings supplied by the Architect (Engineer). The workmanship and finish shall be equal to the best Australian practice.  
All connections shall be riveted wherever possible.

## (b) PAINTING

All steel work, except where encased in concrete, shall be given one good coat of approved protective paint well worked into joints and open spaces. Surfaces in contact shall be cleaned and painted before being riveted together.

## (c) MARKING

Each piece shall be clearly marked to facilitate erection.

## 3—ERECTION.

Steel work shall be carried up true and plumb, temporarily braced, and securely bolted until riveted. All field connections shall be bolted unless otherwise required by the Building Regulations, in which case they shall be riveted. No riveting shall be done until the steel work has been properly aligned.



## SECTION E

[Containing S.A.A. Filing Sections Nos. 13 and 14]

# STRUCTURAL STEEL AND MISCELLANEOUS STEEL AND IRONWORK

## SPECIFICATION FOR THE SUPPLY, FABRICATION AND ERECTION OF STRUCTURAL STEEL

*This Specification has been prepared by the Architectural Staff of Ramsay's Catalogue primarily for the use of the Architect and Engineer, and is based on the best consistent practice; with a view to establishing uniformity in the matter of fabrication and erection the Ramsay Standard Catalogue Service submit this Specification as a contribution to the standardisation of design and construction in the structural steel field.*

NOTE.—In the preparation of this Specification it has been assumed that the General Contractor for the structure would sub-let the supply and fabrication of the steelwork to one firm and to another, or possibly the same firm, the erection thereof. If the General Contractor erects the work himself, then the clauses under "Erection" would still be applicable.

### SECTION 1—GENERAL.

#### (a) ARCHITECT OR ENGINEER

It shall be understood that the Architect or Engineer is the person employed by and acting in the interests of the Owner of the building or structure.

#### (b) SUB-CONTRACTOR

It shall be understood that the Sub-Contractor is the Contractor for the supply and/or the erection of the structural steel as distinct from the General Contractor.

#### (c) DRAWINGS

(1) General and detail drawings showing a complete and full design of the structural steel shall be supplied by the Architect (Engineer) and shall show all materials to be furnished by the Sub-Contractor.

(2) Shop drawings shall be made and submitted to the Architect (Engineer) and shall show all materials to be furnished by the Sub-Contractor.

(3) If in the execution of the work the Sub-Contractor should find discrepancies in the information supplied by the Architect (Engineer) he shall refer such discrepancies to the Architect (Engineer) before proceeding further with the work which would be affected.

#### (d) DELIVERY

Delivery of the materials shall be made with due regard to the progress of the work. The Sub-Contractor shall be responsible for delays that may occur by reason of his failure to deliver any portion of the steel work when the structure is sufficiently advanced to admit of its erection.

#### (e) BUILDING AUTHORITY

The Sub-Contractor shall conform to the requirements of Building Authorities having jurisdiction over the works where these go beyond or conflict with the provisions of this Specification.

### SECTION 2—MATERIALS.

#### (a) QUALITY

All structural steel shall be of Australian manufacture and shall be of a quality to substantially conform to the Australian Standard Specification for Structural Steel.

#### (b) SPECIAL METALS

(1) CAST IRON.—Cast iron must be of tough, grey character and must satisfy a transverse test as follows:—Sample bars one inch square, cast in sand moulds, in a span of twelve inches, shall bear a central load of two thousand pounds.—City of Melbourne, Building By-law No. 168.

(2) CAST STEEL.—All steel castings shall be solid, free from flaws and properly annealed.

(Concluded on opposite page)



# THE BROKEN HILL PROPRIETARY CO.

LIMITED

IRON AND STEEL MASTERS

HEAD OFFICE: MELBOURNE

13b

B.H.P.

S.A.A. File No.

OFFICES:  
LONDON — SYDNEY — ADELAIDE  
PERTH

WORKS:  
Iron Ore Mines:—Iron Knob, S.A.  
Limestone Mines:—Devonport, Tasmania.  
Mills:—Newcastle, N.S.W.

## Products

The products manufactured at the Company's Iron and Steel Works, Newcastle, include: Pig Iron, Steel Ingots, Blooms, Slabs, Billets, Light and Heavy Tee Rails and Fishplates, Bridge Rails, Structural Shapes and a varied range of Flat, Round Square and Angle Sections, Octagons, Wire Rods and Reinforcing Bars; also Tar, Solvent Naphtha, Ammonium Sulphate, Benzol, Toluol, Zylol, and Crushed Slag for concrete and road making.

## Pig Iron

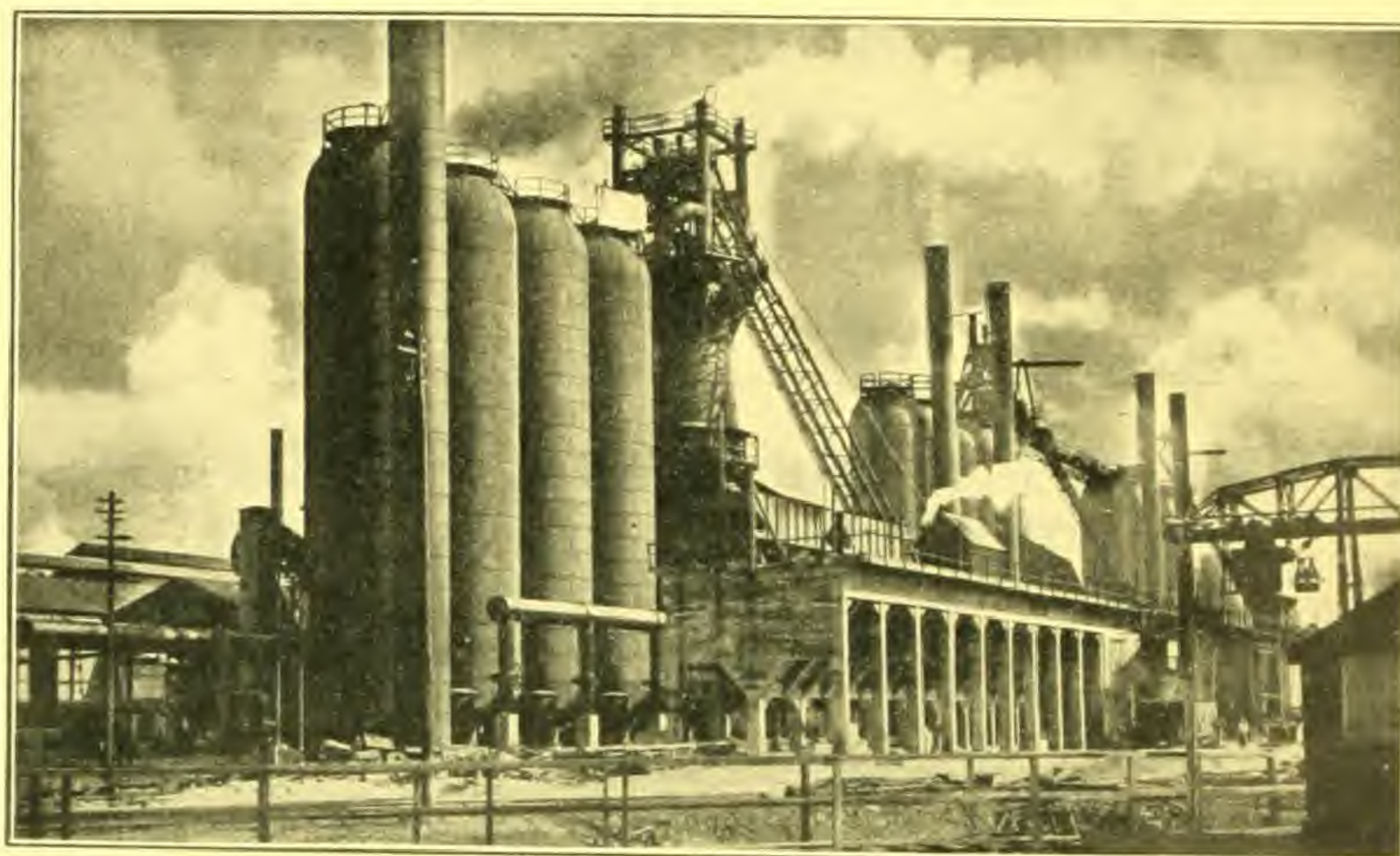
Pig Iron manufactured by the Broken Hill Proprietary Company Limited is produced from high-grade ore, all iron being carefully graded by chemical analysis, which method ensures that consumers obtain a regular and uniform product.

## Steel

B.H.P. Steel is produced by the Basic and Acid Open Hearth Processes. The steel meets the requirements of Standard Specifications, the Admiralty, Lloyds, the Chief Engineers of the Commonwealth and State Railways and other Government Departments of Australia. During manufacture and subsequent rolling operations, all steel is subject to close supervision, ensuring a high-grade product.

## Special Steels

A varied range of special steels is produced at Newcastle; for further information covering characteristics, particulars and uses, write or call at any of the Company's offices.



View of Three Blast Furnaces, Newcastle.

## Steel Sections

B.H.P. structural sections are rolled from steel to the Australian Standard Specifications for Structural Steel A.1/1928.

### Rolling Margin

The recognised rolling margin for Structural Sections is  $2\frac{1}{2}$  per cent. above or below the weights listed.

### Weight of Steel

The weight of Steel Sections listed are theoretical only, and, based on the sectional area of a piece of steel 1 in. square and 1 in. long, weighing 3.4 lbs., or 1 cubic ft. of steel weighing 489.6 lbs.

### Cutting to Lengths

Lengths of all sections ordered are subject to a cutting margin of 2 in. in the length, which may be taken as 1 in.

above or below the ordered lengths, or 2 in. over to nothing under, at the buyer's option.

## Testing

Modern testing machines and chemical laboratories form an integral portion of the Company's Iron and Steel Works. All tests and investigations are conducted under the supervision of a skilled technical staff.

## Technical Service

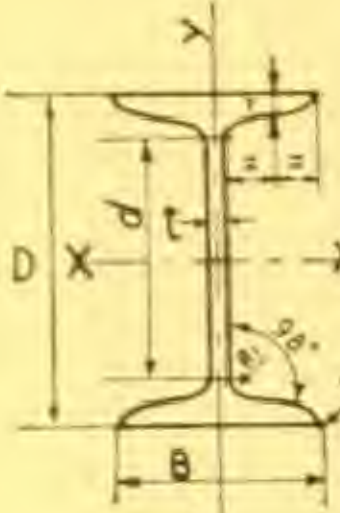
The Company directs special attention to the fact that the services of a Technical Staff are also available for all users of B.H.P. Iron and Steel Products. This service, if desired, covers the selection of special irons and steels, and assistance in the solution of any problems which may arise in the Foundry, Forge or Machine Shop.

(Continued on next page)



TABLE 1.

DIMENSIONS AND PROPERTIES OF I BEAMS (Rolled Steel Joists).



Reference Marks	Size D x B Inches	Weight per ft. Lbs.	Diagram				Sectional Area Inches	Moment of Inertia		Radius of Gyration		Modulus of Section		Size D x B Inches
			Web t	Flange T	Radius R <sub>1</sub>	Radius R <sub>2</sub>		About XX	About YY	About XX	About YY	About XX	About YY	
N.B.S.B.13	24 x 7 1/2	100	.64	.984	.73	.36	29.4	2581.4	63.55	9.37	1.47	215.12	16.68	24 x 7 1/2
N.B.S.B.17	22 x 7	90	.52	.984	.73	.36	26.465	2443.227	60.436	9.608	1.511	203.602	16.116	24 x 7 1/2
N.B.S.B.16	A.S.B.21	20 x 6 1/2	.65	.820	.65	.32	19.119	1226.172	32.559	8.008	1.305	122.617	10.018	20 x 6 1/2
N.B.S.B.15	A.S.B.20	18 x 6	.55	.757	.61	.30	16.182	841.759	23.635	7.212	1.209	93.529	7.878	18 x 6
N.B.S.B.14	A.S.B.18	16 x 6	.50	.726	.61	.30	14.705	618.092	22.468	6.483	1.236	77.261	7.489	16 x 6
N.B.S.B.13	A.S.B.17	15 x 6	.45	.655	.61	.30	13.236	491.912	19.871	6.096	1.225	65.588	6.624	15 x 6
N.B.S.B.12	A.S.B.16	14 x 5 1/2	.40	.627	.57	.28	11.765	377.059	14.788	5.661	1.121	53.866	5.377	14 x 5 1/2
N.B.S.B.11	A.S.B.15	13 x 5	.35	.604	.53	.26	10.298	283.507	10.815	5.247	1.025	43.616	4.326	13 x 5
N.B.S.H.B.8	A.S.B.14	12 x 8	.65	.904	.77	.38	19.122	487.769	65.184	5.051	1.846	81.295	16.296	12 x 8
N.B.S.B.10	A.S.B.13	12 x 5	.30	.507	.53	.26	8.827	206.931	8.770	4.842	.997	34.488	3.508	12 x 5
B.S.B.19		10 x 8	.70	.97	.70	.35	20.60	344.90	71.67	4.09	1.86	68.98	17.92	10 x 8
N.B.S.H.B.7	A.S.B.12	10 x 8	.55	.783	.77	.38	16.177	288.688	54.743	4.224	1.840	57.738	13.686	10 x 8
N.B.S.B.9	A.S.B.10	10 x 4 1/2	.25	.505	.49	.24	7.354	122.338	6.486	4.079	.939	24.468	2.883	10 x 4 1/2
N.B.S.B.8	A.S.B.9	9 x 4	.21	.457	.45	.22	6.177	81.127	4.148	3.624	.820	18.028	2.074	9 x 4
N.B.S.H.B.4	A.S.B.8	8 x 6	.35	.648	.61	.30	10.296	115.058	19.540	3.343	1.378	28.764	6.513	8 x 6
N.B.S.B.7	A.S.B.7	8 x 4	.18	.398	.45	.22	5.296	55.629	3.506	3.241	.814	13.907	1.753	8 x 4
N.B.S.B.6	A.S.B.6	7 x 3 1/2	.15	.398	.41	.20	4.416	35.904	2.408	2.851	.738	10.258	1.376	7 x 3 1/2
N.B.S.H.B.3	A.S.B.5	6 x 5	.25	.561	.53	.26	7.351	45.162	9.876	2.479	1.159	15.064	3.951	6 x 5
N.B.S.B.5	A.S.B.4	6 x 3	.12	.377	.37	.18	3.533	20.989	1.461	2.437	.643	6.996	.974	6 x 3
N.B.S.B.4		5 x 2 1/2	.9	.347	.33	.16	2.647	10.910	.789	2.030	.546	4.364	.631	5 x 2 1/2
N.B.S.H.B.1	A.S.B.2	4 x 3	.10	.347	.37	.18	2.940	7.786	1.326	1.627	.672	3.893	.884	4 x 3
	3 x 2 1/2	5.7	.17	.262	.27	.10	1.693	2.55	.418	1.22	.497	1.70	.358	3 x 2 1/2

\*Nominal Size. Width about 7 1/2". Note—This Section may be altered. Sizes and Properties are for NBS Beam with Thickened Web.

TABLE 2.

 ROLLED STEEL I BEAMS AS GIRDERS.  
 SAFE DISTRIBUTED LOAD IN TONS, ABOUT AXIS X-X.

TABLE 2.

Size Inches.	Weight per ft., Lbs.	SPAN IN FEET.																		Size Inches.
		2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	36	40	
24 x 7 1/4*	100				129.9	111.7	95.6	81.9	71.7	63.7	57.4	52.1	47.8	44.1	41.0	38.2	35.8	31.9	28.7	24 x 7 1/2*
24 x 7 1/2	90					98.3	90.5	77.5	67.8	60.3	54.3	49.4	45.2	41.7	38.7	36.2	33.9	30.1	27.1	24 x 7 1/2
22 x 7	75				88.2	81.2	67.7	58.0	50.7	45.1	40.6	36.9	33.8	31.2	29.0	27.0	25.4	22.5	20.3	22 x 7
20 x 6 1/4	65				72.2	65.4	54.5	46.7	40.8	36.3	32.7	29.7	27.2	25.1	23.3	21.8	20.4	18.2	16.3	20 x 6 1/4
18 x 6	55				61.5	49.9	41.6	35.6	31.2	27.6	24.9	22.7	20.8	19.2	17.8	16.6	15.6	13.8	12.4	18 x 6
16 x 6	50			53.64	51.5	41.2	34.3	29.4	25.7	22.8	20.6	18.7	17.2	15.8	14.7	13.7	12.9	11.4	10.3	16 x 6
15 x 6	45			48.0	43.7	35.0	29.1	25.0	21.8	19.4	17.4	16.0	14.5	13.4	12.5	11.6	10.9	9.7	8.7	15 x 6
14 x 5 1/2	40			44.24	35.9	28.6	23.9	20.5	17.9	15.9	14.3	13.0	11.9	11.0	10.2	9.5	8.9	7.9	7.1	14 x 5 1/2
13 x 5	35		39.12	38.7	29.1	23.3	19.3	16.6	14.5	12.9	11.6	10.5	9.6	8.9	8.3	7.8	7.2	6.4	5.8	13 x 5
12 x 8	65			46.4	43.4	36.1	30.9	27.1	24.1	21.7	19.7	18.1	16.7	15.5	14.6	13.5	12.0	10.9	12 x 8	
12 x 5	30		34.2	30.6	22.9	18.4	15.3	13.1	11.5	10.2	9.2	8.3	7.7	7.1	6.5	6.1	5.7	5.1	4.6	12 x 5
10 x 8	70			54.0	45.9	36.8	30.6	26.2	23.0	20.4	18.4	16.7	15.3	14.1	13.1	12.2	11.5			10 x 8
10 x 6	55			36.0	30.8	25.6	21.9	19.2	17.1	15.4	14.0	12.8	11.8	10.9	10.2	9.6				10 x 6
10 x 4 1/2	25		26.7	21.7	16.3	13.0	10.9	9.3	8.1	7.2	6.5	6.0	5.4	5.0	4.6	4.3	4.1			10 x 4 1/2
9 x 4	21	24.3	24.0	16.0	12.0	9.6	8.0	6.8	6.0	5.3	4.8	4.3	4.0	3.7	3.4					9 x 4
8 x 6	35			25.2	19.2	15.3	12.8	10.9	9.6	8.5	7.7	6.9	6.4	5.9	5.5					8 x 6
8 x 4	18	20.2	18.5	12.4	9.3	7.4	6.2	5.3	4.6	4.1	3.7	3.4	3.1	2.8	2.6					8 x 4
7 x 3 1/2	15	15.7	13.7	9.1	6.8	5.5	4.6	3.9	3.4	3.0	2.7	2.5	2.3	2.1						7 x 3 1/2
6 x 5	25		17.8	13.4	10.0	8.0	6.7	5.7	5.0	4.5	4.0	3.6								6 x 5
6 x 3	12	12.2	9.3	6.2	4.7	3.7	3.1	2.7	2.3	2.1	1.9									6 x 3
5 x 2 1/2	9	9.0	5.8	3.9	2.9	2.3	1.9	1.6	1.4											5 x 2 1/2
4 x 3	10	8.6	5.2	3.5	2.6	2.1	1.7	1.5	1.3											4 x 3

\*Nominal Size. Width about 7 1/2".

For Dimensions and Properties, see Table 1.

Girders to have usual side supports as in building work.

The tabular values of the safe distributed dead loads for the various spans of beam, as given above, are based on an allowable fibre stress of 8 tons per square inch.

To find the safe distributed dead load giving an extreme fibre stress of 7 1/2 tons per square inch, multiply the tabular load values by 1 1/2.

Tabular loads to right of heavy zig-zag line produce deflection greater than 1/32 in. per foot of span.

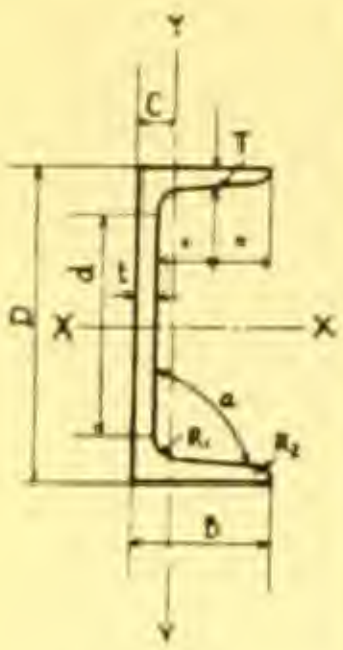
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TABLE 3.

TABLE 3.

## DIMENSIONS AND PROPERTIES OF ROLLED STEEL CHANNELS.



Reference Marks	Size D x B Inches.	Weight per Foot Lbs.	Standard Thickness		Radii		Sectional Area—Inches <sup>2</sup>	Centre of Gravity Distance C	Moment of Inertia		Radius of Gyration		Modulus of Section		Size D x B Inches.
			t	T	R <sub>1</sub>	R <sub>2</sub>			About X-X	About Y-Y	About X-X	About Y-Y	About X-X	About Y-Y	
NBSC17 ASC11	15 x 4	36.37	.41	.62	.60	.30	10.696	.967	349.095	13.338	5.713	1.117	46.546	4.398	15 x 4
NBSC15 ASC10	12 x 3½	29.23	.40	.60	.54	.27	8.596	.901	180.292	8.436	4.580	.991	30.049	3.245	12 x 3½
NBSC13 ASC 9	10 x 3½	24.46	.36	.56	.54	.27	7.193	.965	109.520	7.420	3.902	1.016	21.904	2.927	10 x 3½
NBSC10 ASC 8	9 x 3	17.46	.30	.44	.48	.24	5.136	.781	62.522	3.752	3.489	.855	13.894	1.691	9 x 3
NBSC 8 ASC 7	8 x 3	15.96	.28	.44	.48	.24	4.694	.834	46.720	3.578	3.155	.873	11.680	1.652	8 x 3
NBSC 4 ASC 5	6 x 3	12.41	.25	.38	.48	.24	4.182	.875	32.750	3.255	2.798	.882	9.357	1.531	7 x 3
NBSC 6 ASC 6	7 x 3	14.22	.26	.42	.48	.24	3.650	.890	21.271	2.825	2.414	.880	7.090	1.339	6 x 3
NBSC 3 ASC 4	5 x 2½	10.22	.25	.38	.42	.21	3.006	.773	11.873	1.641	1.987	.739	4.749	.950	5 x 2½
NBSC 2 ASC 3	4 x 2	7.09	.24	.31	.38	.18	2.085	.599	5.063	.703	1.558	.581	2.532	.502	4 x 2
NBSC 1 ASC 2	3 x 1½	4.60	.20	.28	.30	.15	1.352	.476	1.823	.261	1.161	.439	1.215	.255	3 x 1½
BHPC	3 x 1½	7.58	.44	.34	.37	.31	2.252	.569	2.690	.456	1.09	.45	1.79	.386	3 x 1½
BHPC	3 x 1½	8.855	.56	.34	.37	.31	2.627	.603	2.971	.757	1.06	.537	1.98	.595	3 x 1½

ANGLE  $\alpha$   
NBSC 95°  
BHPC 98°

TABLE 4.

TABLE 4.

## ROLLED STEEL CHANNELS AS GIRDERS. (Braced to Prevent Twisting).

## SAFE DISTRIBUTED LOADS IN TONS. ABOUT AXIS X-X.

Size Inches.	Weight per Foot Lbs.	SPAN IN FEET.																		Size Inches.
		2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	36	40	
15 x 4	36.37	55.34	55.34	41.37	31.03	24.82	20.68	17.73	15.51	13.79	12.41	11.28	10.34	9.54	8.86	8.27	7.76	6.89	6.20	15 x 4
12 x 3½	29.23	43.20	40.06	26.71	20.03	16.03	13.35	11.45	10.02	8.90	8.01	7.28	6.68	6.16	5.72	5.34	5.01	4.45	4.01	12 x 3½
10 x 3½	24.46	32.40	29.20	19.47	14.65	11.68	9.73	8.34	7.30	6.49	5.84	5.31	4.87	4.49	4.17	3.89	3.66			10 x 3½
9 x 3	17.46	24.30	18.52	12.35	9.26	7.41	6.17	5.29	4.63	4.12	3.70	3.37	3.09	2.85	2.65	2.47				9 x 3
8 x 3	15.96	20.16	15.57	10.38	7.79	6.23	5.19	4.45	3.89	3.46	3.11	2.83	2.59							8 x 3
7 x 3	14.22	16.38	12.48	8.32	6.24	4.99	4.16	3.56	3.12	2.77	2.49	2.27								7 x 3
6 x 3	12.41	13.50	9.45	6.30	4.73	3.78	3.15	2.70	2.36	2.10	1.89									6 x 3
5 x 2½	10.22	11.26	6.33	4.22	3.16	2.53	2.11	1.81	1.58											5 x 2½
4 x 2	7.09	6.76	3.38	2.25	1.69	1.35	1.13													4 x 2
3 x 1½	4.60	3.24	1.62	1.08	.81	.65														3 x 1½

The tabular values of the safe distributed dead loads for the various spans of beam, as given above, are based on an allowable fibre stress of 8 tons per square inch.

To find the safe distributed dead load giving an extreme fibre stress of  $7\frac{1}{2}$  tons per square inch, multiply the tabular load values by  $\frac{3}{4}$ .

Tabular loads to right of heavy zig-zag line produce deflection greater than  $\frac{1}{4}$  in. per foot of span.

(Continued on next page)



Table 5.

## SINGLE ROLLED STEEL I BEAMS AS COLUMNS OR STRUTS.

Table 5.

SAFE LOADS FOR VARIOUS HEIGHTS OR LENGTHS.

Size D x B Inches.	Weight per Foot Lbs.	Least Rad. Gyration Inches.	SAFE CONCENTRIC LOADS IN TONS FOR LENGTHS IN FEET.																Size D x B Inches.
			4	5	6	7	8	9	10	11	12	14	16	18	20	22	24		
24 x 7½*	100	1.47	189.0	181.1	173.3	165.4	157.5	149.7	141.8	133.9	126.0	110.6	94.5	78.8				24 x 7½*	
24 x 7½	90	1.511	170.9	164.0	157.2	150.3	143.4	136.5	129.6	122.7	115.8	102.0	88.2	74.4	60.6			24 x 7½	
22 x 7	75	1.364	140.0	133.6	127.3	120.9	114.5	108.2	101.8	95.4	89.1	76.3	63.6	50.9				22 x 7	
20 x 6½	65	1.305	120.3	114.6	108.8	103.0	97.3	91.5	85.7	80.0	74.2	62.7	51.1					20 x 6½	
18 x 6	55	1.209	100.2	95.0	89.7	84.5	79.2	73.9	68.6	63.4	58.1	47.6	38.9					18 x 6	
16 x 6	50	1.236	91.6	86.9	82.2	77.5	72.8	68.2	63.5	58.8	54.1	44.7	35.4					16 x 6	
15 x 6	45	1.225	82.3	78.0	73.8	69.5	65.3	61.0	56.8	52.5	48.3	39.7	31.3					15 x 6	
14 x 5½	40	1.121	71.7	67.6	63.4	59.3	55.2	51.1	46.9	42.8	38.7	30.4						14 x 5½	
13 x 5	35	1.025	61.3	57.4	53.4	49.6	45.6	41.7	37.7	33.7	29.8							13 x 5	
12 x 8	65	1.846	124.3	123.0	118.9	114.9	109.8	105.7	101.6	97.6	93.5	85.3	77.2	69.0	60.9	52.7	44.6	12 x 8	
12 x 5	30	.997	56.0	52.4	48.8	45.1	41.5	37.8	34.2	30.6	26.9							12 x 5	
10 x 8	70	1.86	133.9	132.7	128.3	124.0	119.6	115.3	110.9	106.5	102.2	93.5	84.7	76.0	67.3	58.6	49.9	10 x 8	
10 x 5	55	1.84	105.2	104.0	100.6	97.1	93.7	90.2	86.7	83.3	79.8	72.9	66.0	59.1	52.1	45.2	38.3	10 x 5	
10 x 4½	25	.939	42.8	39.7	36.6	33.6	30.5	27.4	24.3	21.2	18.1							10 x 4½	
9 x 4	21	.82	34.5	31.5	28.5	25.6	22.6	19.6	16.7									9 x 4	
8 x 6	35	1.378	66.4	63.5	60.5	57.6	54.6	51.7	48.8	45.7	42.8	36.9	31.00	25.1				8 x 6	
8 x 4	18	.814	30.0	27.5	25.1	22.7	20.2	17.9	15.3									8 x 4	
7 x 3½	15	.738	23.7	21.4	19.0	16.7	14.3	11.9	9.6									7 x 3½	
6 x 5	25	1.159	45.1	42.6	40.1	37.7	35.2	32.7	30.2	27.7	25.2	20.2						6 x 5	
6 x 3	12	.643	17.8	15.7	13.5	11.4	9.2											6 x 3	
5 x 2½	9	.546	12.2	10.3	8.4	6.5												5 x 2½	
4 x 3	10	.672	15.2	13.4	11.7	10.0	8.3	6.5										4 x 3	

\* Nominal Size. Width abt. 7½".

## Explanation of Table 5

Table 5 of safe loads on single rolled steel I-beam as columns is calculated by the straight line formula,  $7.5 - .0328 \text{ l/r}$ , maximum 6.5 tons per sq. in. on the gross cross-sectional area with static axial loading, on the

assumption that the ends are fixed or adequately constrained laterally as in usual building practice.

Before using this table it would be advisable to consult the local building regulations, as these may require that a different column formula should be used.

## Rounds

Diameter. (Ins.)	Cross-Sectional Area. (Sq. Ins.)	Weight per Ft. (Lbs.)
¼	.0491	.167
⅜	.0767	.261
½	.1105	.376
⅝	.1964	.668
¾	.3068	1.043
7/8	.4418	1.5
1	.6013	2.04
1 1/8	.7854	2.67
1 ¼	.9940	3.38
1 ½	1.2272	4.19
1 ¾	1.4849	5.05
1 ⅝	1.7671	6.01
1 ¾	2.0739	7.05
1 ¾	2.4053	8.178
1 ¾	2.7612	9.388
2	3.1416	10.681
2 ¼	3.5466	12.056
2 ½	3.9761	13.518
2 ¾	4.4301	15.062
2 ¾	4.9087	16.688
2 ¾	5.4119	18.398
2 ¾	5.9396	20.192
2 ¾	6.4918	22.070
3	7.0686	24.030

## Flats

⅝ x ⅝, ⅝ and ⅝ in.  
 ¾ x ⅝ in., rising by ⅛ in. to ¾ x ½ in.  
 ⅝ x ⅝ in., rising by ⅛ in. to ⅝ x ½ in.  
 1 x ⅝ in., rising by ⅛ in. width and thickness to 1 ⅛ x ½ in.  
 1 ½ x ⅝ in., rising by ⅛ in. width and ⅛ in. thickness to 2 x 1 in.  
 2 ⅝ x ⅝ in., rising by ⅛ in. width and ⅛ in. thickness to 2 ¼ x 1 in.  
 2 ¾ x ⅝ in., rising by ⅛ in. width and ⅛ in. thickness to 3 x 1 in.  
 3 ½ x ⅝ in., rising by ⅛ in. to 3 ½ x 1 in.  
 4 x ⅝ in., rising by ⅛ in. width and ⅛ in. thickness to 8 x 1 in.  
 9 x ⅝ in., rising by ⅛ in. to 9 x ⅝ in.  
 10 x ⅝ in., rising by ⅛ in. to 10 x ¾ in.  
 12 x ⅝, ⅝, ⅝ and ⅝ in.

## Girder Plates—

14, 16 and 18 in. width x ⅝ in., rising by ⅛ to ¾ in. thick.

(Continued on next page.)



## Equal Angles

Size—Inches.	Weight per Ft. Lbs.
8 × 8 × $\frac{5}{8}$	32.68
8 × 8 × $\frac{3}{4}$	38.89
8 × 8 × $\frac{7}{8}$	45.00
8 × 8 × 1	51.01
6 × 6 × $\frac{3}{8}$	14.82
6 × 6 × $\frac{1}{2}$	19.55
6 × 6 × $\frac{5}{8}$	24.17
6 × 6 × $\frac{3}{4}$	28.69
6 × 6 × 1	37.40
5 × 5 × $\frac{3}{8}$	10.30
5 × 5 × $\frac{1}{2}$	12.28
5 × 5 × $\frac{5}{8}$	16.16
5 × 5 × $\frac{3}{4}$	19.93
5 × 5 × 1	25.59
4 × 4 × $\frac{3}{8}$	8.17
4 × 4 × $\frac{1}{2}$	9.72
4 × 4 × $\frac{5}{8}$	12.75
4 × 4 × $\frac{3}{4}$	15.67
3½ × 3½ × $\frac{3}{8}$	7.11
3½ × 3½ × $\frac{1}{2}$	8.45
3½ × 3½ × $\frac{5}{8}$	11.05
3½ × 3½ × $\frac{3}{4}$	13.55
3 × 3 × $\frac{3}{8}$	4.89
3 × 3 × $\frac{1}{2}$	6.05
3 × 3 × $\frac{5}{8}$	7.17
3 × 3 × $\frac{3}{4}$	9.35
3 × 3 × 1	11.42
2½ × 2½ × $\frac{3}{8}$	4.04
2½ × 2½ × $\frac{1}{2}$	4.98
2½ × 2½ × $\frac{5}{8}$	5.90
2½ × 2½ × $\frac{3}{4}$	7.65
2¼ × 2¼ × $\frac{3}{8}$	1.06
2¼ × 2¼ × $\frac{1}{2}$	1.31
2¼ × 2¼ × $\frac{5}{8}$	1.55
2 × 2 × $\frac{3}{8}$	2.43
2 × 2 × $\frac{1}{2}$	3.19
2 × 2 × $\frac{5}{8}$	3.92
2 × 2 × $\frac{3}{4}$	4.62
1¾ × 1¾ × $\frac{3}{8}$	2.11
1¾ × 1¾ × $\frac{1}{2}$	2.76
1¾ × 1¾ × $\frac{5}{8}$	3.39
1½ × 1½ × $\frac{3}{8}$	1.23
1½ × 1½ × $\frac{1}{2}$	1.79
1½ × 1½ × $\frac{5}{8}$	2.34
1½ × 1½ × $\frac{3}{4}$	2.85

## Equal Angles—Continued

Size—Inches.	Weight per Ft. Lbs.
1¼ × 1¼ × $\frac{1}{8}$	1.02
1¼ × 1¼ × $\frac{3}{16}$	1.48
1¼ × 1¼ × $\frac{1}{4}$	1.91
1 × 1 × $\frac{1}{8}$	.80
1 × 1 × $\frac{3}{16}$	1.15
1 × 1 × $\frac{1}{4}$	1.49

## Unequal Angles

Size—Inches.	Weight per Ft. Lbs.
6½ × 4½ × $\frac{3}{8}$	13.54
6½ × 4½ × $\frac{1}{2}$	17.84
6½ × 4½ × $\frac{5}{8}$	22.04
6½ × 4½ × $\frac{3}{4}$	26.13
6 × 4 × $\frac{3}{8}$	12.28
6 × 4 × $\frac{1}{2}$	16.16
6 × 4 × $\frac{5}{8}$	19.93
6 × 4 × $\frac{3}{4}$	23.59
6 × 3½ × $\frac{3}{8}$	11.63
6 × 3½ × $\frac{1}{2}$	15.30
6 × 3½ × $\frac{5}{8}$	18.86
6 × 3½ × $\frac{3}{4}$	22.31
5 × 4 × $\frac{3}{8}$	11.00
5 × 4 × $\frac{1}{2}$	14.45
5 × 4 × $\frac{5}{8}$	17.80
5 × 3 × $\frac{3}{8}$	8.17
5 × 3 × $\frac{1}{2}$	9.72
5 × 3 × $\frac{5}{8}$	12.75
5 × 3 × $\frac{3}{4}$	15.67
4 × 3 × $\frac{3}{8}$	7.11
4 × 3 × $\frac{1}{2}$	8.45
4 × 3 × $\frac{5}{8}$	11.05
4 × 3 × $\frac{3}{4}$	13.55
3½ × 3 × $\frac{3}{8}$	6.58
3½ × 3 × $\frac{1}{2}$	7.81
3½ × 3 × $\frac{5}{8}$	10.20
3½ × 3 × $\frac{3}{4}$	12.49
3½ × 2½ × $\frac{3}{8}$	4.89
3½ × 2½ × $\frac{1}{2}$	6.05
3½ × 2½ × $\frac{5}{8}$	7.17
3½ × 2½ × $\frac{3}{4}$	9.35

## LIVE LOADS IN BUILDINGS.

Most building regulations treat the live or superimposed load on a floor as equivalent to an assumed dead or stationary load. For floors carrying machinery with heavy moving parts, special calculation is necessary. A comparison of floor loads, as stipulated in the by-laws of capital cities of the Commonwealth, is given below.

SUPERIMPOSED FLOOR LOADS IN LBS. PER SQ. FOOT.  
(In terms of Dead Loading)

	Sydney 1917.	Melbourne 1923.	Adelaide 1923.	Brisbane 1926.	Perth 1929.
Dwellings . . . . .	50	70	50	70	75
Offices . . . . .	60	84	60	84	100
Retail Shops . . . . .	100	140	100	140	120
Places of Assembly . . . . .	100	140	100	140	120
Ballrooms and Drill Halls . . . . .	150	—	150	—	150
Book Stores, Libraries and Museums . . . . .	200	—	200	—	—
Warehouses . . . . .	150	168	100	140	According to use.
Workshops and Fac- tories . . . . .	100	140	150	168	220 to 670
Hardware, Machinery, Paper Stores, and Printeries . . . . .	300	—	300	—	—
Flat Roofs . . . . .	120	70	120	70	—
Horizontal Wind Pressure . . . . .	30*	25	25	25	—

\*Where combined direct and bending stress due to wind is considered, a working stress of 25 per cent. in excess of that allowed in tension or compression may be used (Sydney).

IMPACT ALLOWANCE TO BE ADDED TO ACTUAL  
MOVING LOAD.

	Sydney 1917. %	Brisbane 1916. %	Perth 1916. %
Moving loads, other than crowds . . . . .	15 to 30	25	50
Girders supporting a crane . . . . .	50	—	—
Floors carrying machinery . . . . .	—	—	100

## WEIGHTS OF MATERIALS.

	Lbs. per cub. ft.
Ashes . . . . .	40 to 45
Brickwork . . . . .	140
Cement Mortar . . . . .	135
Coke Breeze Concrete . . . . .	112
Concrete (plain) . . . . .	140
Concrete (reinforced) . . . . .	150
Earth (dry and loose) . . . . .	70
Earth (compacted) . . . . .	135
Granite Masonry . . . . .	160 to 170
Gravel . . . . .	110 to 120
Pine (white) . . . . .	25
Pine (yellow) . . . . .	40
Sand (dry) . . . . .	90 to 120
Sandstone Masonry . . . . .	140 to 160
Seasoned Hardwood (average) . . . . .	60 to 70





## GEO. W. KELLY & LEWIS PTY. LTD. ENGINEERS

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S.A.A. File No.

[For Other Products, See Pages 297 and 493]

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Steel-frame Buildings, Tanks, Girders, Bridge-work and all Structural Engineering Work.

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Geo. W. Kelly & Lewis Pty. Ltd. have at Springvale, Victoria, a structural steel plant capable of handling the largest and most complicated structural work. The whole of the plant is laid out in such a manner as to ensure economical handling of a large variety of work, being served throughout by overhead electric travelling cranes and equipped with machinery of the most modern type.

The plant has its own railway siding, which enables work to be despatched without rehandling, this being a very important factor to be considered when buying structural steelwork, as careless rehandling of some work may cause members to be strained out of their true position to such an extent that they require resetting.

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The stock-yards at Springvale carry a comprehensive stock of Australian and British standard sections of Joists, Channels, equal and unequal angles, and Tees. Also, large stocks of plates, both ship and boiler quality, flats and bars are carried.

### Fabrication and Erection

Geo. W. Kelly & Lewis Pty. Ltd. are equipped and organised to fabricate and erect structural steelwork anywhere, and are prepared to estimate and advise on any work of this nature.

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All structural steel used conforms to the Australian Standard Specification for Structural Steel.

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A staff of experienced structural engineers and draughtsmen is maintained at the Springvale Works and these are always at the service of clients to prepare designs and complete shop working drawings from architect's drawings or proposals. Alternatively, shop drawings will be prepared from the architect's or engineer's own designs.

### Engineering Service

In addition to preparing designs and shop drawings from architects' and engineers' proposals, the Geo. W. Kelly & Lewis staff of engineers are in a position to carry a construction programme right from the preliminary proposals and designs to the final completion of the job. By co-operation between mechanical and structural engineers, a large variety of work can be handled successfully.

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New Turbine and Boiler House at Yallourn.  
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Structural Steelwork for Spencer Street Bridge.  
Structural Steelwork for Bridges over Maribyrnong and Murray Rivers, etc.

Mechanical  
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Note Steelwork  
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### Plant

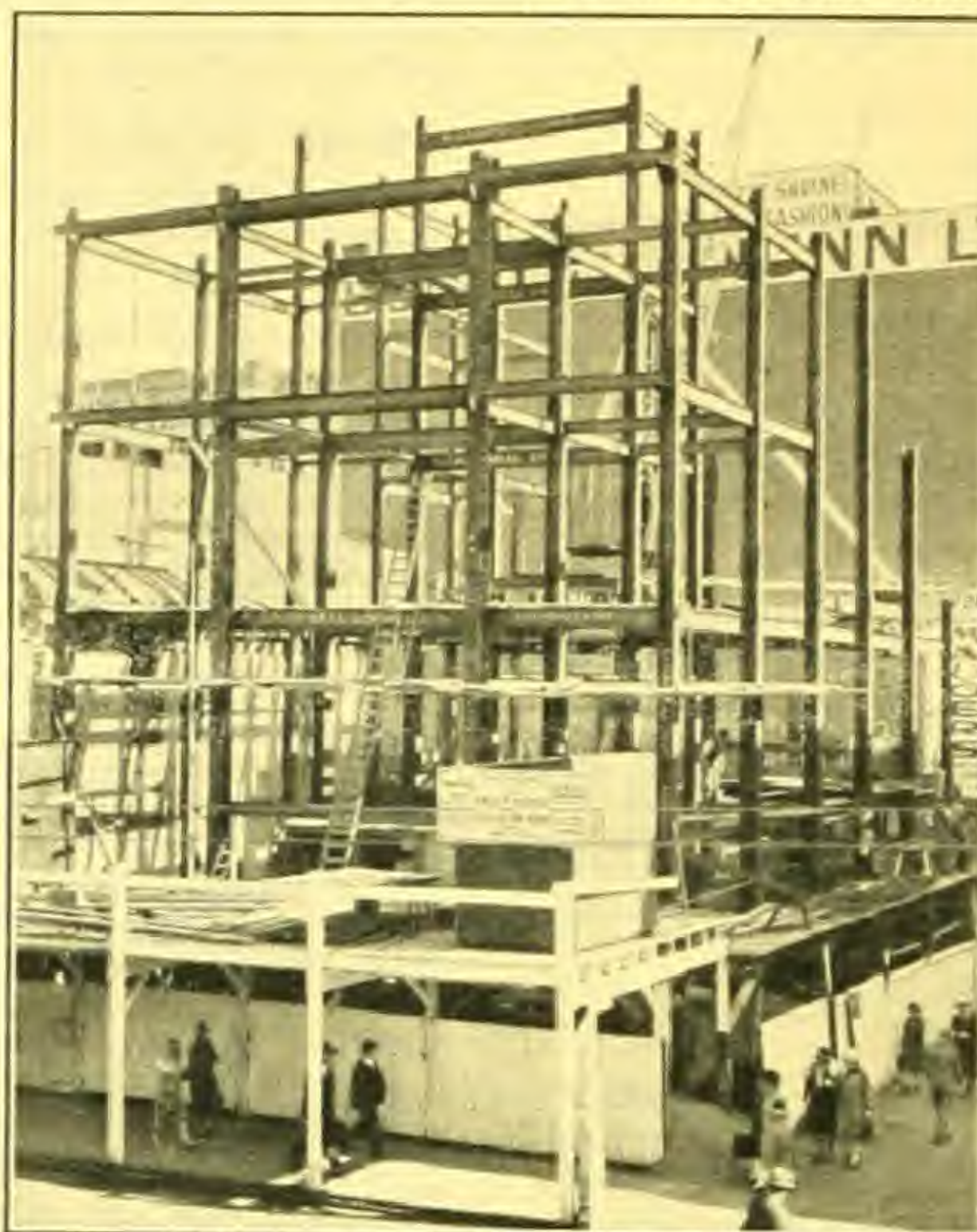
The structural steel plant of Edward Campbell & Son Pty. Ltd., located at Franklin Street, Melbourne, comprises machines capable of turning out high-class work, stock-yards carrying a large variety of sections, and an erecting shop, the whole being equipped with overhead electric travelling cranes.

The plant has a central location, thus facilitating rapid delivery to any part of the Commonwealth. Sections carried in stock include British and Australian Standard Rolled Steel Joists, Channels, Equal and Unequal Angles, Tees, Flats and Plates, Chequer Plates and Bars.

Complete gear for erecting structural work is always available, and Edward Campbell & Son Pty. Ltd. are prepared to submit proposals, and prices for this type of work.

### Riveted Construction

For important heavy structural steelwork the riveted joint is at present unrivalled for safety, due partly to the fact that the joint can be satisfactorily inspected and guaranteed to be, within reasonable limits, as strong as the designer proposed. In addition, locked-up or residual stresses of indeterminate value due to high temperatures will not be present in the completed structure.



English, Scottish & Australian Bank Ltd.,  
Swanston Street, Melbourne.  
Architects: Henry Hare & Hare.

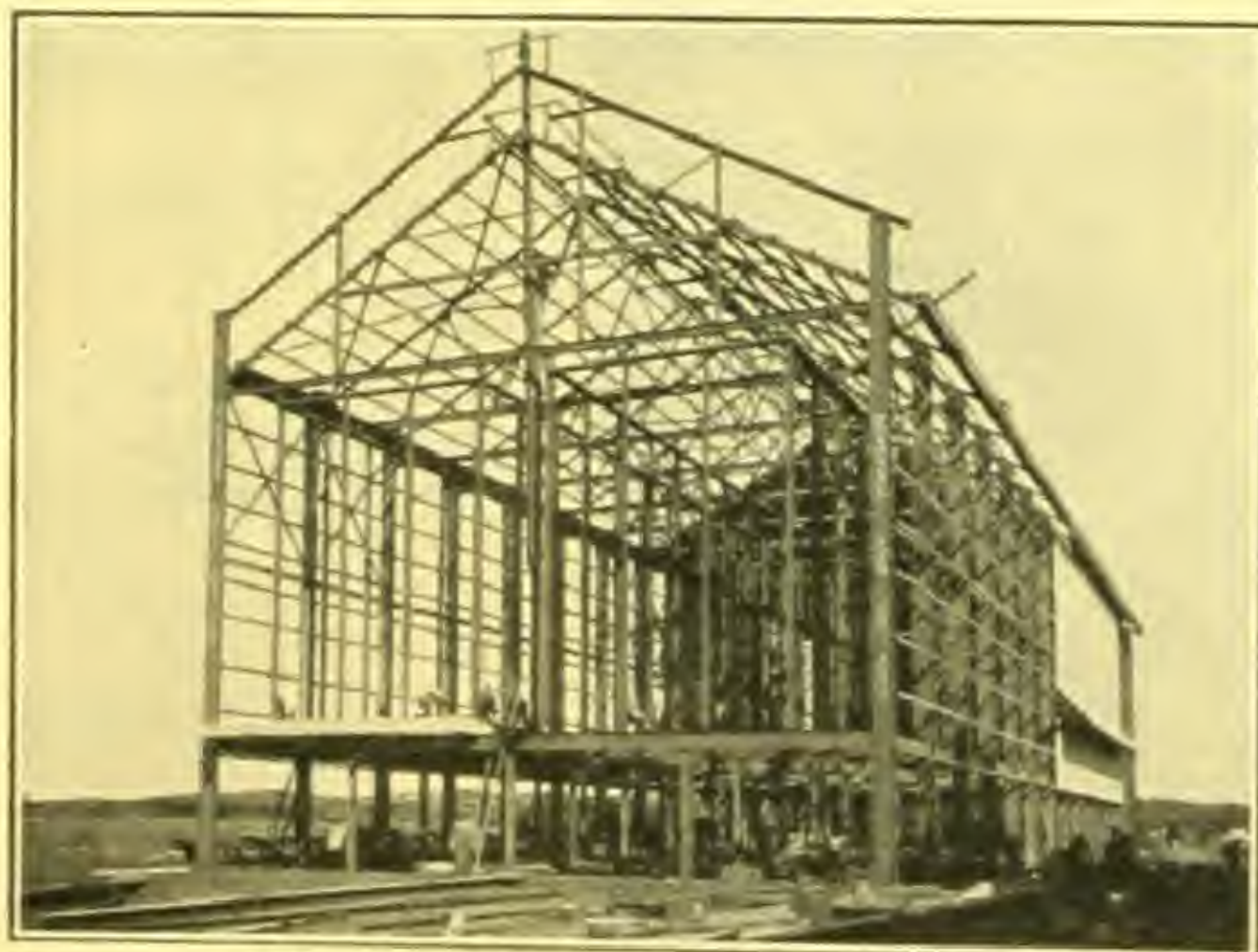
### Welded Construction

For certain classes of light structural work as, for instance, light steel-framed buildings, welded construction makes a very economical and strong structure. Welding allows great flexibility in the design of steel buildings and so permits a structure more suited to its particular purpose than would be the case with other methods of construction.

Edward Campbell & Son Pty. Ltd. are equipped to undertake this class of work, and will give clients the benefit of their past experience of this type of construction.

### Services of Designers and Estimators

In their offices at Victoria St., Melbourne, adjacent to the works, Edward Campbell & Son Pty. Ltd. maintain a staff of experienced designers and estimators who are at all times ready to give fast and reliable service in the preparation of preliminary estimates, or to tender on architects' and engineers' own designs.



Chemical Works, Geraldton, W.A.  
Riveted Construction.



Erecting Hangar, Laverton, Victoria.  
Electrically Welded Construction.



### Delivery and Erection

Edward Campbell & Son Pty. Ltd. will take care of delivery to any part of Australia and will erect their own structural steelwork if desired.

### Advantages of Steel Construction

The advantages of steel as compared with other types of construction are as follows:—

Steel is always thoroughly tested before being used in the structure, and is manufactured under very rigid control. It can therefore be relied upon to carry the loads assigned to it.

The stresses in a steel structure can be calculated with more precision than in any other type of construction, so allowing of a more economical design.

Steel construction allows a great latitude for designs to suit various processes and purposes.

The actual setting out and fabrication of the structure is done in the works, where the proper tools and machines are available for handling the work. Under these conditions, the structure can be built to plans and specifications more accurately than when the whole of the construction is carried out at the site, where it is subject to interference from weather, traffic and various local conditions. A steel structure can be taken down, altered, transported to a new location and re-erected to suit alterations in procedure, re-organisation, etc., and can have the load for which it was designed applied immediately after the completion of construction.

### Cantilever Verandahs

Notes from City of Melbourne Building By-laws.

**Minimum live loads for Roofs to Cantilever Verandahs**—30 lb. per sq. ft.

**Framing of Steel** throughout, except ceiling battens.

**Ceiling** of approved Stamped Metal, on 2 x 1 in. red-wood battens.

**Fall** of  $\frac{1}{2}$  in. per foot toward building in roof.

**Soffit** to be horizontal.

**Fascia** must have an overall finished depth of 18 in. for 10 ft. footpaths, 21 in. for 12 ft., and 24 in. for 18 ft.

**Height above Pavement**.—For 18 ft. footpaths, 12 ft.; for lesser widths, 11 ft., where adjacent to existing verandahs, to approval of Surveyor.

**Steps**.—If the fall is flatter than 1 in 30, steps shall not exceed 12 in. without special permission.

**Roofing** of 24-gauge Galvanized Corrugated Iron, clipped or bolted to purlins, lapped two corrugations at sides and 9 in. minimum at ends, riveted every 12 in. at sides and every third corrugation at ends.

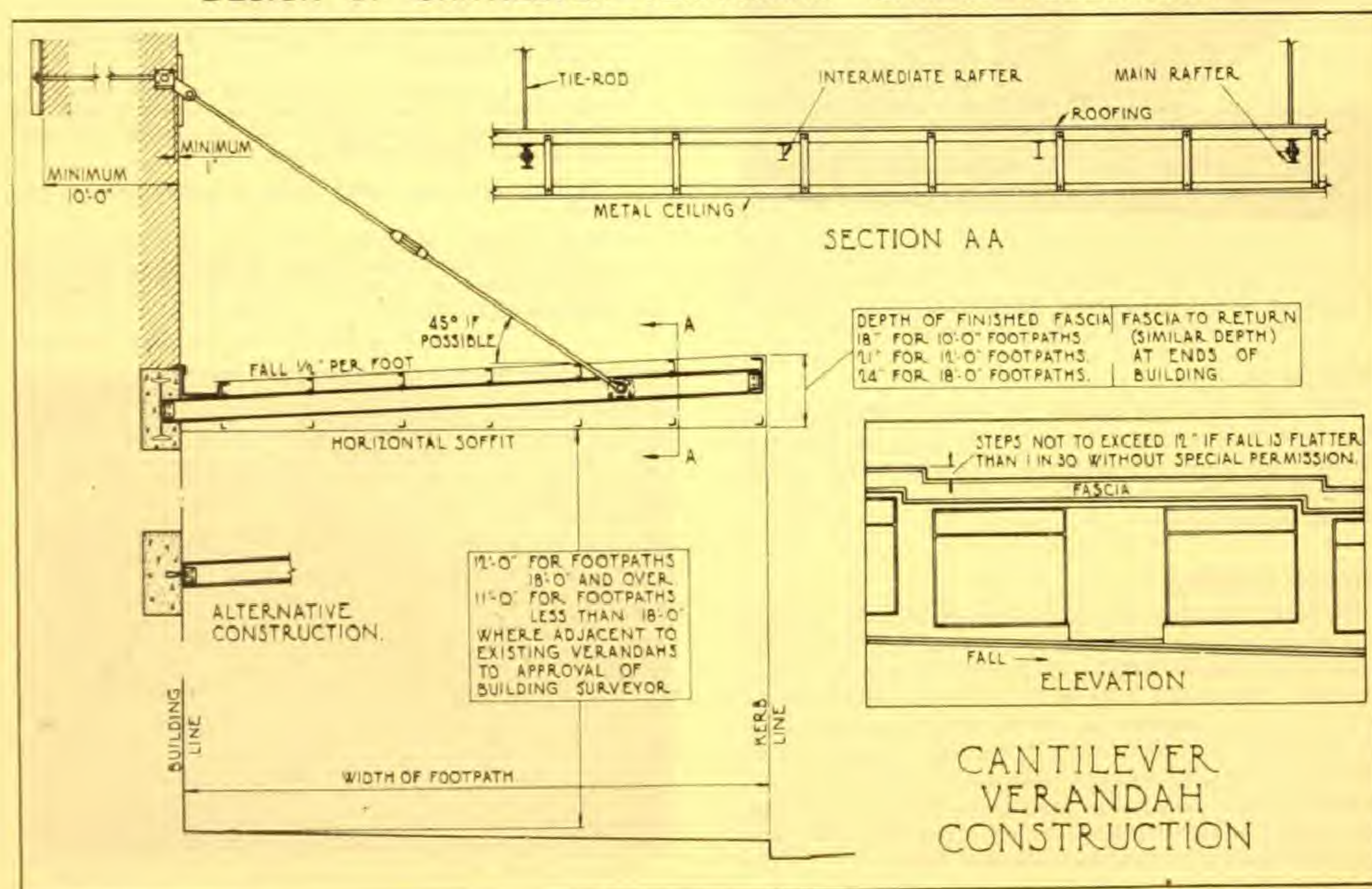
**Box Gutters** at or near the building line of 20-gauge galvanized iron, well lapped, riveted and soldered at ends of each sheet and supported on metal straps. (Steel straps at 2 ft. 6 in. centres.)

See Building Surveyor re conforming to adjacent verandahs.

#### REPRESENTATIVE WORK

E.S. & A. Bank, Swanston Street, Melbourne.  
Majorca House, Melbourne.  
T. & G. Building, Sydney.  
Chemical Works at Guildford, Bunbury, Geraldton, W.A.  
Hangars at Laverton, Victoria.  
Melbourne Harbour Trust Cargo and Passenger Sheds, Vict.  
Burdekin Bridge, Queensland.  
Bridge over Merri Creek, Victoria.  
Gasworks at Highett, Victoria; Launceston, Tasmania, etc.  
Eastern Market, Carlyon's, and other verandahs.

### DESIGN OF CANTILEVER VERANDAHS (CITY OF MELBOURNE)





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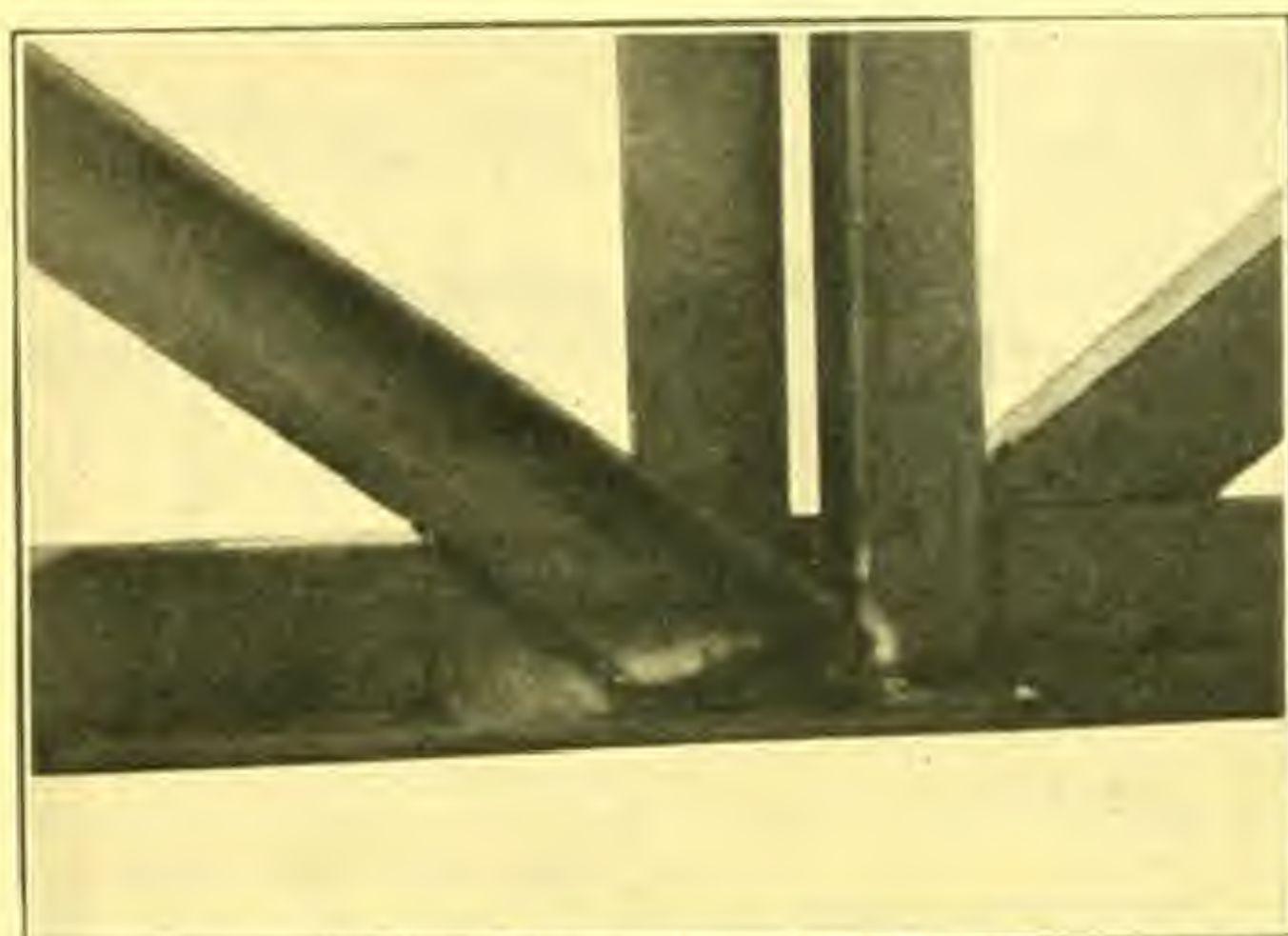
## WELDED STRUCTURES

### Products

Medium and heavy structural work of all kinds, steel-framed buildings, roof trusses, bridges, storage tanks for oil, water or other liquids, elevated storage tanks, pipe lines, pipe specials, etc.

### Design

We can quote either to architect's design or alternatively will submit designs to architect's requirements. Our designing staff is directed by highly qualified and experienced technical men. Our specialised knowledge of Structural Engineering is at the disposal of clients. As most of our structural work is electrically welded, it is in clients' interest to give us an opportunity for submitting designs that take full advantage of the economies offered by electric welding.



Typical Joint used in Welded Lattice Girders.

### Fabrication

Our workshops are under the direct supervision of technically trained men. Our plant is modern, and only efficient workmen are employed. Accuracy and a high standard of workmanship are maintained by rigid and critical supervision.

### Electric Welding

Gardner Constructions are indisputably the leading Structural Welding Engineers in Australia. We are convinced that electric welding is better in every way than riveting. The recent falls in the costs of riveted structural steel are largely due to the efforts of structural firms to meet the lower costs of welded structures. Our workshop and supervision methods are such that the "human factor" is of less importance than in riveting. The design of electrically welded structures has now been developed to a rational scientific basis.

### Field Work

Our organisation comprises erection gangs supervised by experienced foremen. We are pleased to quote for completely erected steel structures of any kind, in any part of Australia. We have erected a large amount of work in practically every State in the Commonwealth. We claim that there are few firms in Australia so well equipped for construction work in distant locations.

### Specification Guide

The following clauses should be incorporated:—

1. Covered electrodes of approved make only shall be used. Bare wire or dipped electrodes on no account to be accepted.
2. All welding transformers shall be equipped with ammeters. Welding current shall not exceed 120 amps. and be no lower than 100 amps. on the secondary sides of transformer. Transformers to be fitted with suitable reactance.
3. Light run welds only shall be used. Where greater strength is required, this shall be obtained by multiple runs. (See table below.)
4. Where one run is superimposed on another run, the first weld must be chipped free of all slag before the second run is made.
5. Proper penetration of weld metal into parent metal shall be obtained.
6. Where two pieces of metal are welded together, they shall be free of dirt, oil and scale where the weld is being made. They shall be wedged up tight to ensure proper penetration.
7. Skilled tradesmen only shall be employed on the job.
8. The number of runs per weld, the number of inches per stick, the gauge of the electrode, and the number of inches of weld shall be specified for each joint.



Pyke's Creek Bridge being assembled in our workshops.

(Continued on next page)



## Electrically Welded Oil Tanks

Gardner Constructions are specialists in the erection of large electrically welded Bulk Tanks. During the past four (4) years, fourteen (14) tanks, varying from 300,000 to 1,200,000 gallon capacity have been erected by us, in addition to many containers of smaller capacity.

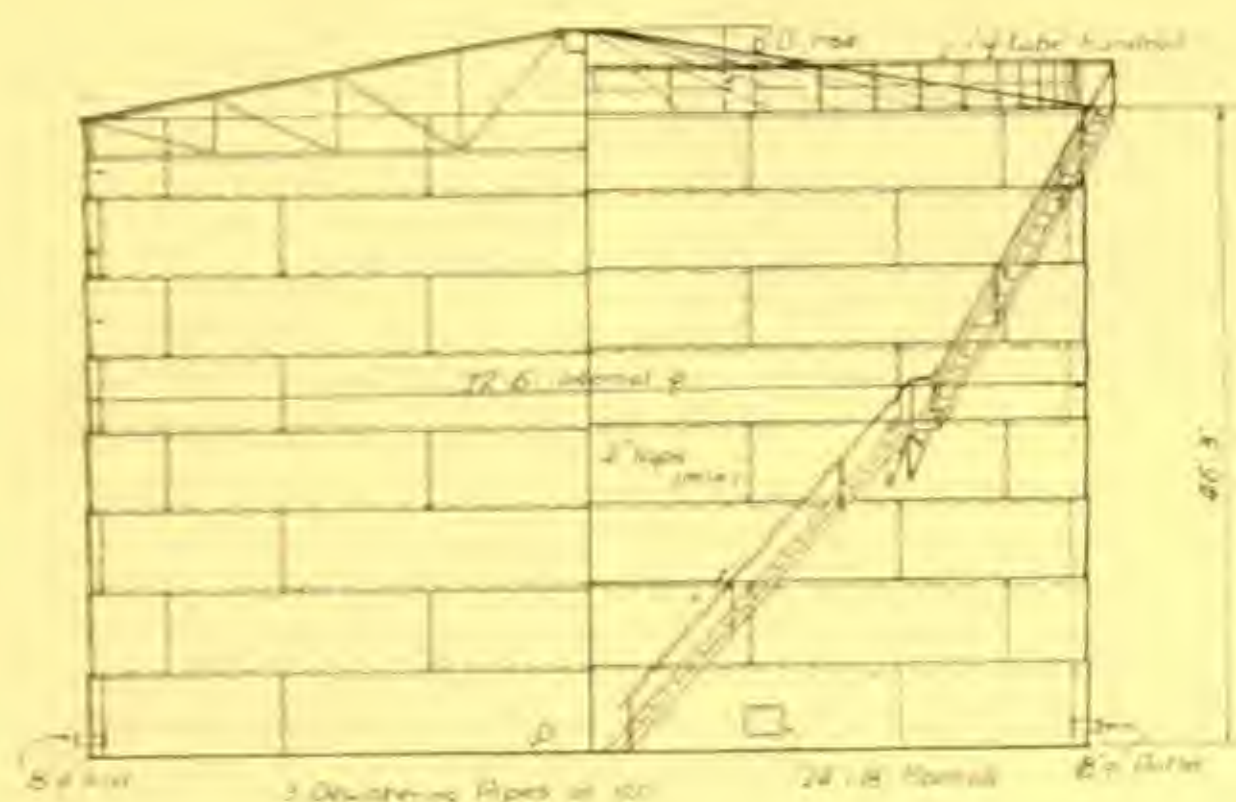
The electrically welded tank is the only container that will remain tight over a period of years. Owing to the stretching of rivets under load, riveted tanks always develop leaks. The process of welding makes the whole tank homogeneous, thus all joints are hermetically sealed.

Welded joints can be made from 90 per cent.—100 per cent. strong. It is, therefore, possible to obtain equivalent strength with thinner plates than would be possible with a riveted joint where the efficiency is usually about 70 per cent. The strength of a tank, of course, depends

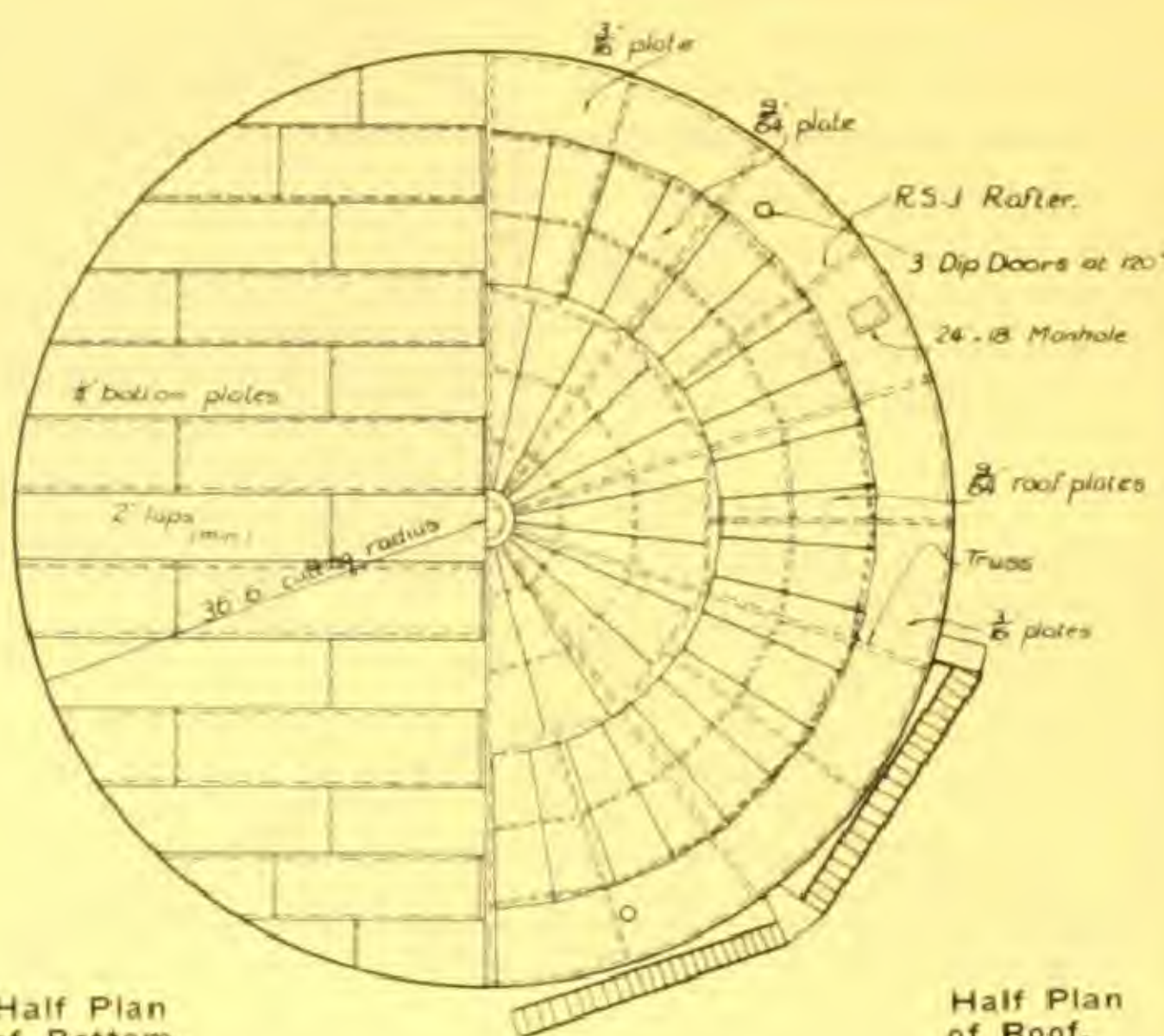
directly on the efficiency of the joint. This factor permits of a big saving in weight and combined with other economies made possible by welding means a greatly reduced capital outlay. Reference to our clients will prove our claim that a leak has never been found in any large tank constructed by us.

When it is required to develop full strength of material, or where the welding is of particular nature, special procedure is developed to suit the conditions.

The service of our technical staff is available to help you in such jobs.



Elevation.

Half Plan  
of Bottom.Half Plan  
of Roof.


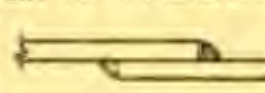
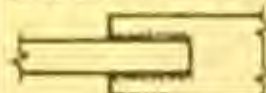
LARGE PETROL STORAGE TANK — CAPACITY, 1,200,000 GALLONS.

## Strengths of Welds

We have tabulated below the strengths of welds most commonly used in our workshop practice.

These figures are conservative, allowing a factor of safety of from  $4\frac{1}{2}$  to 5 on test pieces welded under actual shop conditions.

### STRENGTHS OF WELDS FOR STRUCTURAL PURPOSES USING MILD STEEL COVERED ELECTRODES

LAP WELDS	NUMBER OF RUNS	SIZE OF ELECTRODE	LENGTH OF RUN PER ELECTRODE INCHES	STRENGTH IN TONS PER LINEAL INCH OF WELD	
				END WELDS	SIDE WELDS
					
$\frac{1}{4}$ , $\frac{3}{8}$ , & $\frac{1}{2}$ METAL	1	10	7	.65	.5
$\frac{1}{2}$ METAL OR OVER	1 FOLLOWED BY 2	10 8	7 7	1.4	1.15

When using the table the following design details should be observed.

Where possible the joints should be so designed that the stresses on the welds may be resolved into forms on which information of the strengths of welds is obtainable. For instance, butt welds should be in direct tension or compression; fillet welds in end or side shear. Where stresses cannot be resolved into such forms, full size or other tests may be carried out to prove the strength of the joint.

Fillet welds that are designed to take loads should be so arranged as to prevent occurrence of bending or twisting moments in individual welds.

Where a member carrying stress is welded to another member the centres of gravity of the welded seams should be on the centre of gravity of the member.

The rational basis to which welding design and fabrication have been developed enables the designer to specify the job as accurately as is possible in riveted construction. A large variety of completed jobs, both in Australia and abroad, are sufficient evidence of the safety of welded structures. Quoting just one example, the Dallas Power and Light Company have just completed a building of nineteen storeys, in the City of Dallas, the frame of which is entirely electrically welded. We look forward to the date when Australia rivals this effort.

(Continued on next page)



## GARDNER WELDED ROOF TRUSSES

## Standard Roof Trusses

We have standard trusses to suit most requirements. The spans range from 20 ft. to 60 ft., in multiples of 2 ft., but the trusses can readily be altered to suit any span.

These trusses are economical in design and give a maximum strength for a minimum amount of material. They are designed to carry galvanized corrugated iron sheeting on either steel or timber purlins.

Below is shown the types of trusses for various spans. We recommend that they be spaced at from 14 ft. to 15 ft. apart when laying out a roof.

The standard pitch of our trusses is  $22\frac{1}{2}$  deg.

## Other Types

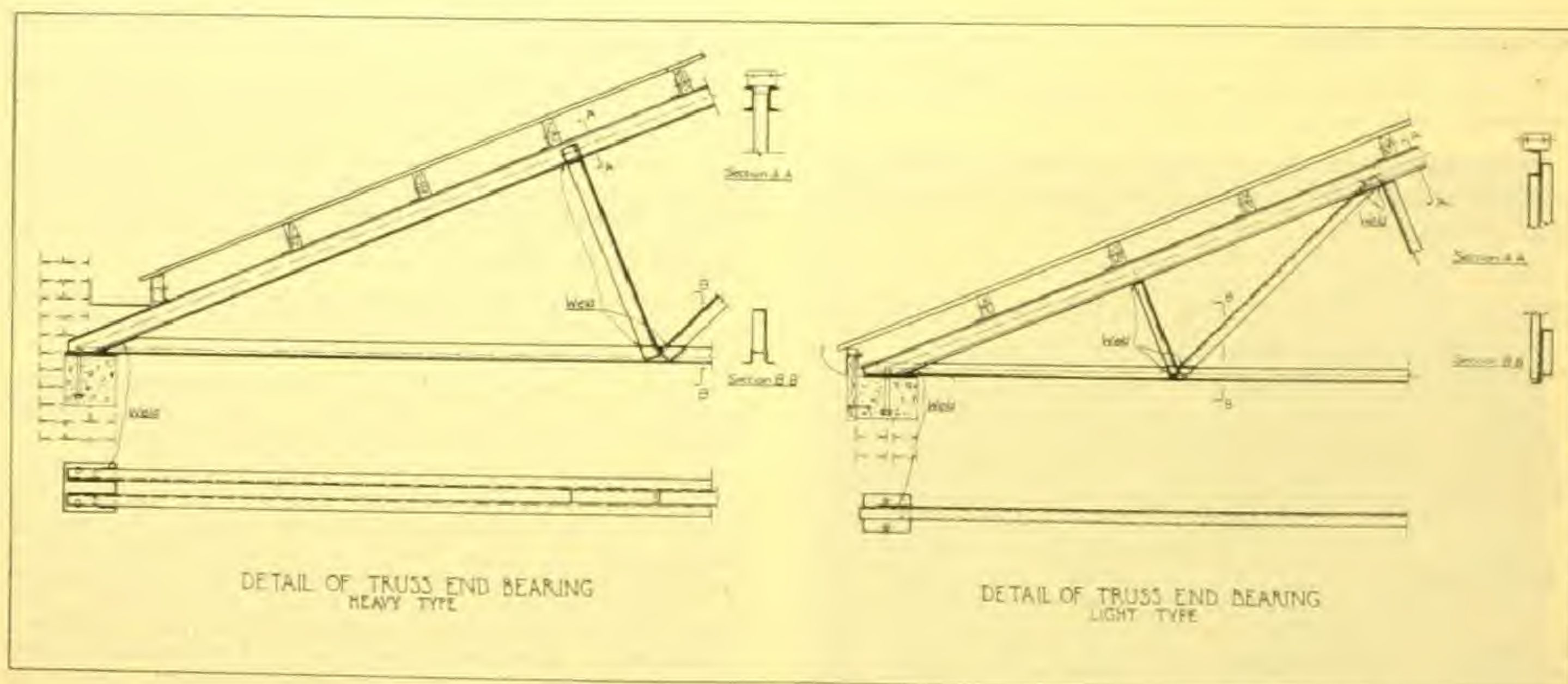
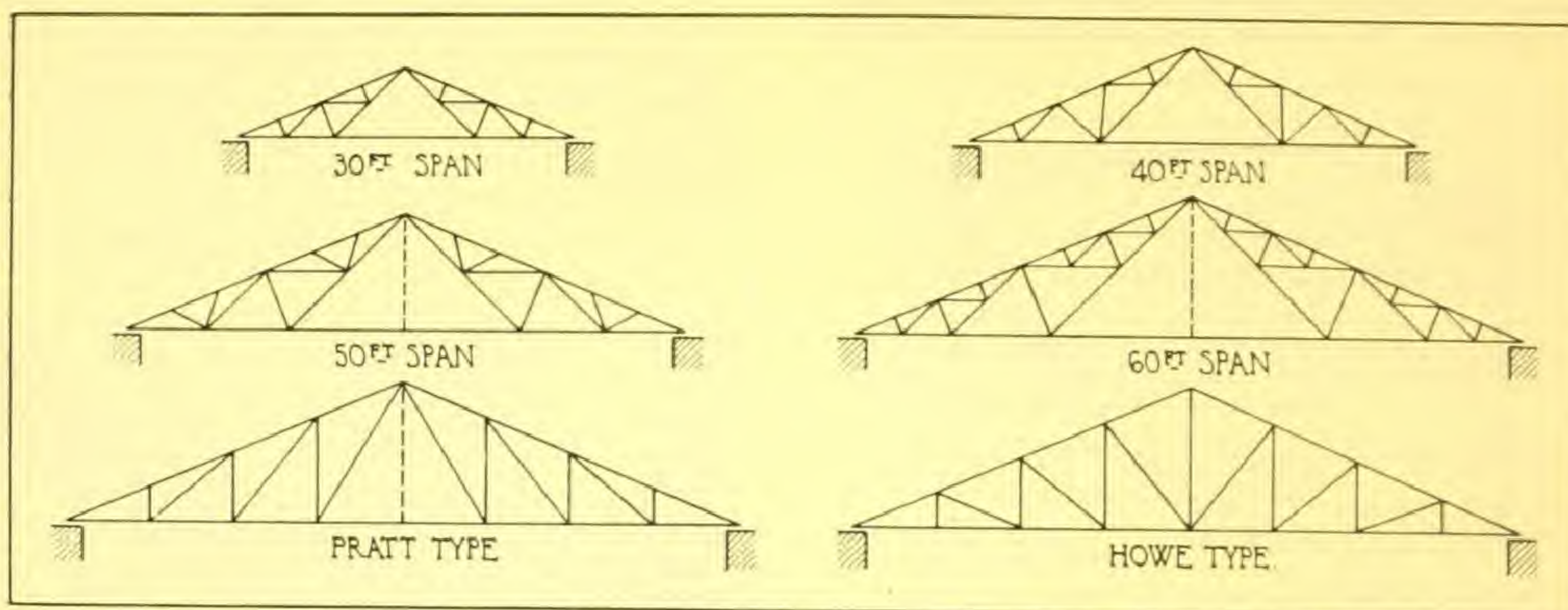
We design and fabricate trusses to carry slate and tile covering or any special type of truss that may be required.

## Truss Framing Details

The lighter type of trusses are supplied in one piece, while the larger types are supplied in convenient sections for transporting and are connected together in the field by means of bolts.

Truss sections may be welded together in the field in preference to bolting if desired.

Below is shown details of end bearings for trusses. These details are adjustable to any span.





## LIGHT STRUCTURES

### Products

Standard Unit Construction Buildings of all types, Sheds, Roof Trusses and anything constructed of light steel sections.

### General Description

In introducing Standard Unit Construction buildings, we have aimed at bringing the benefits of mass construction within the reach of everyone. At the same time beauty and individuality have been introduced into every building by varying the combination of a number of standard parts. Two of the latest developments in engineering science—arc and spot welding—are employed.

This method has revolutionised the production of this type of building, giving greater strength. Because of the large increase in the volume of its business, Gardner Constructions have been enabled in recent years to continually offer reduced prices.

### Interchangeable Units

Each building consists of a number of interchangeable units. As the units are all made to jigs, assembly offers no difficulties. The wall units consist of panels constructed of angle irons electrically welded. When the units are bolted together they form the structural frame of the building. The wall sheeting is fastened to the panels either by bolting and spot welding or with metal fillets. Roof trusses are all made to jig and connection to wall framework is simple and strong.

### GARDNER STANDARD GARAGES

#### Facilities

Our garages are of special interest. Clients can obtain their garage without any worry to themselves. We arrange building permits, give free advice on location, type, etc., and can have the job completed within a few days of receipt of order.

### Advantages

The Advantages of the Gardner Master-built steel-frame Garages are:

Fire proof; Time proof.

A continuous asset—readily saleable for removal.

Accommodating—easily moved or extended.

Vermin proof—unaffected by white ants or borers.

Satisfaction—the status of Gardner Constructions is a guarantee of a satisfactory job.

Where modifications of the design are desired to match existing buildings, we can submit proposals that will give satisfaction to the most exacting critic.

Windows, either fast or opening, with welded steel frame, are built into Standard panels and so can be introduced as desired.

### Dimensions

Corrugated or Ripple Iron panels are standard in widths of 1 ft. 1½ in., 2 ft. 2 in., 3 ft. and 4 ft. 2½ in.

Fibro Cement, etc., panels are 1 ft. 0½ in., 2 ft. 0½ in., 3 ft. 0½ in., 4 ft. 0½ in. Heights of all panels are 7 ft. 0½ in., 8 ft. 0½ in., 9 ft. 0½ in., 10 ft. 0½ in., or higher if necessary. Standard sizes are:—Ripple Iron: 13 ft., 15 ft., 17 ft., 19 ft. and 21 ft. long, by 8 ft. 9 in., 10 ft., 13 ft. or 17 ft. wide. Fibro Cement: 12 ft., 14 ft., 16 ft., 18 ft., or 20 ft., by 9 ft., 10 ft., 12 ft., or 20 ft. wide.

### Country Buildings

Owing to light weights and ease of erection our sections are filling a long-felt want for a cheap, strong and durable method of constructing woolsheds, shearers' huts, barns, bungalows, etc.

The absence of fire risk and damage by white ants or borers appeals to the practical side, while their neat appearance compared to the usual building of this kind is an added advantage.



Main Totalisator Building, Moonee Valley Racecourse (unfinished).



Special Garage.



Utility Garage.

GARDNER STANDARD GARAGES.



14k

S.A.A. File No.

**D. & W. CHANDLER LTD.***The Biggest Hardware House in Victoria*234-236 FLINDERS LANE, MELBOURNE  
F 4175 (4 lines)276-294 BRUNSWICK STREET, FITZROY  
J 4145 (7 lines)

And At

Armstrong Street, BALLARAT  
Lava Street, WARRNAMBOOLHargreaves Street, BENDIGO  
Pynsent Street, HORSHAM

[For Other Products, See Pages 36, 76, 175, 251 and 492]

**CHANDLER GATES AND FENCES****Products**

Chandler Products include Fabric Fencing and Gates; Chain Wire Work of all description, including Fences, Shop and Machine Guards, Tennis Court Enclosures, etc.; Garden Arches, Garden Seats, Tree Guards, Hand Gates, Driveway Gates, Square Steel Tube Gates and Panels, Wrought Iron Panels, Mild Steel Gates and Panels and Ringlock Fencing.

**Materials**

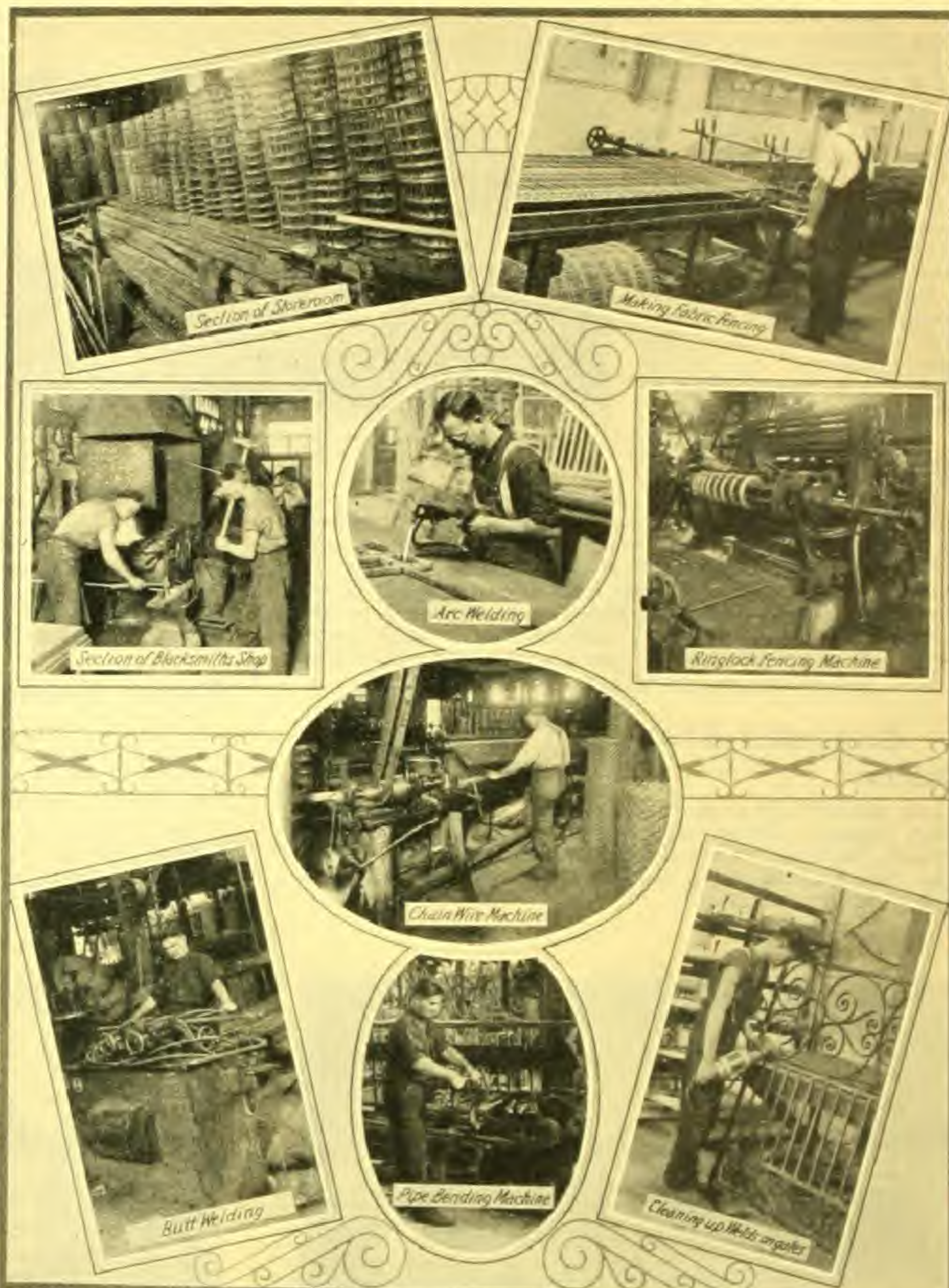
All materials are of the best quality and are specially selected for strength and heavy galvanising where necessary.

**Manufacture**

Chandler's factory is equipped with all the latest machines for manufacturing fencing and gates. All work is built by our own skilled wire and steel workers under expert supervision. Fittings have been standardised, thus enabling us to keep the cost of production as low as possible.

**Designs**

If our large range of designs is unsuitable, new designs can always be made to suit your client's specification.

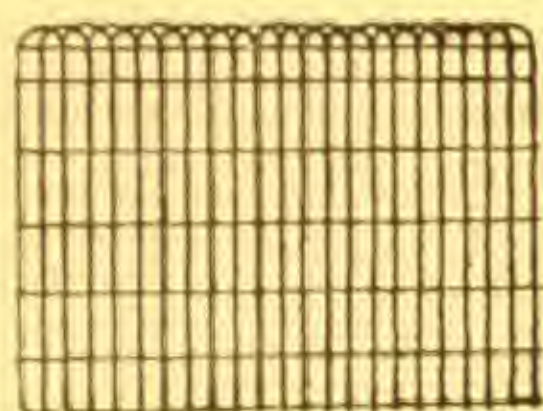


Illustrating some of the operations performed and machines used for the production of CHANDLER GATES and FENCES in our factory at Greeves Street, Fitzroy.

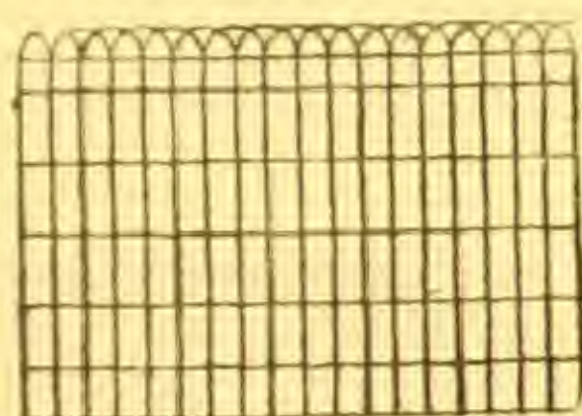
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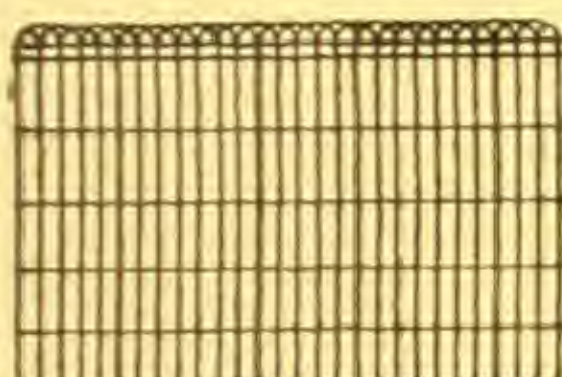
## CHANDLER FABRIC FENCING AND GATES



"A" Pattern



"C" Pattern



"D" Pattern



"XX" Pattern

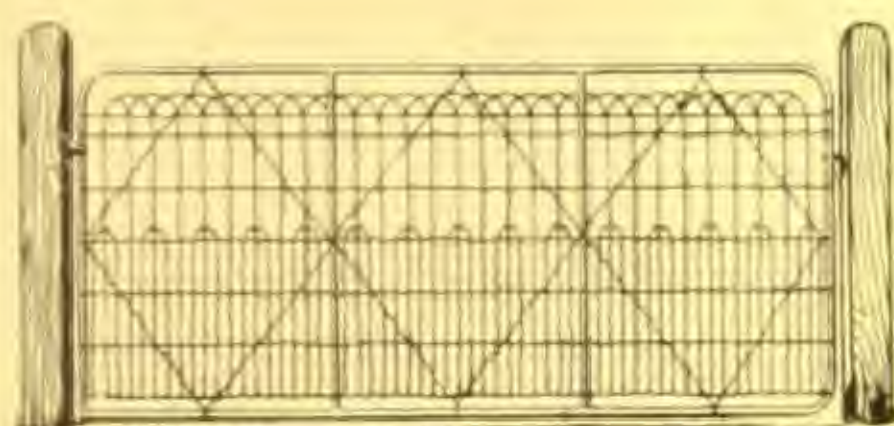
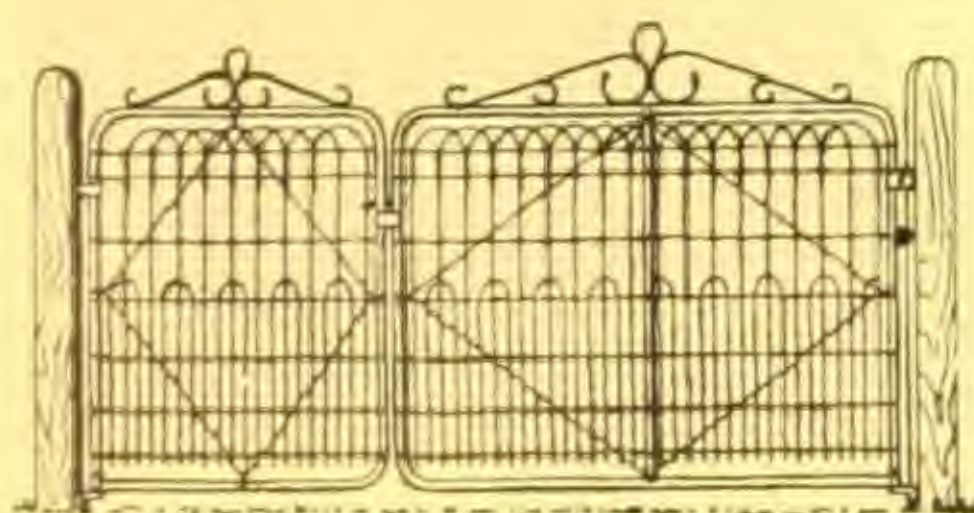


Fig. 202

Chandler Driveway Gate, Single Style.

Chandler Driveway Gate, Double Style.  
Matches "F" Fencing.

## Description

Chandler Fabric Fencing is machine made from the best quality fencing material. The droppers are made of crimped No. 8 wire and the cables are two 13 gauge wires.

The dropper is tightly twisted between the cables, producing a fence that is practically everlasting.

Chandler Fabric Fencing is made in eight different styles, as illustrated on this page.

Each pattern is made in four heights, viz.: 36, 42, 46 and 52 inches.

## Gates

Hand Gates are made of 1½ in. best steel tubing with all joints electrically welded. The fabric is laced to the tube frame. Driveway Gates are made of 1½ in. steel tubing. Gates are made 3 ft. 4 in. and 3 ft. 10 in. high. Hand Gates are made in three widths: 3, 3½ and 4 ft.

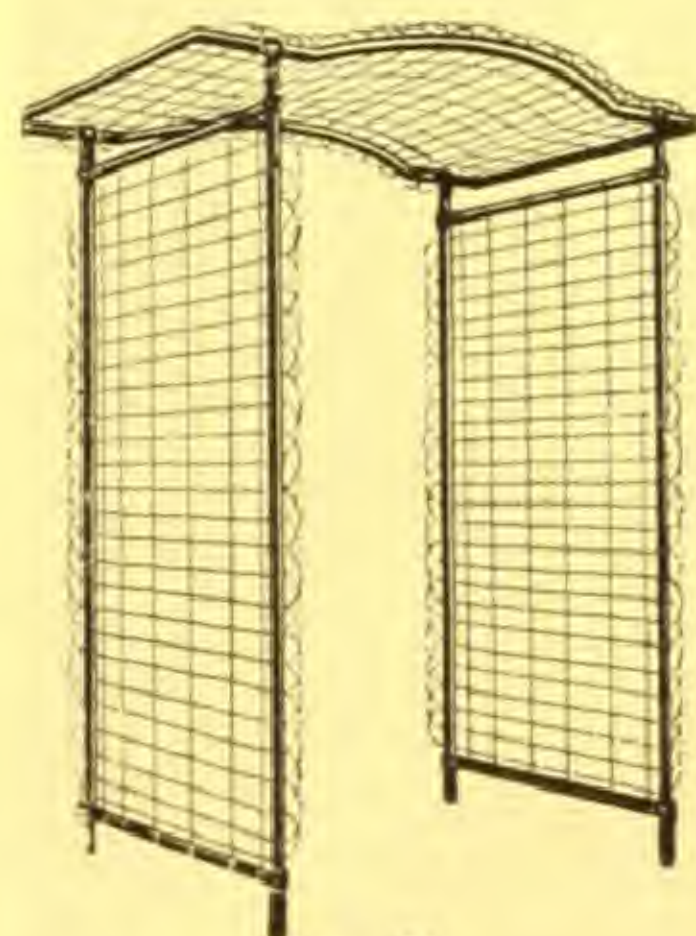
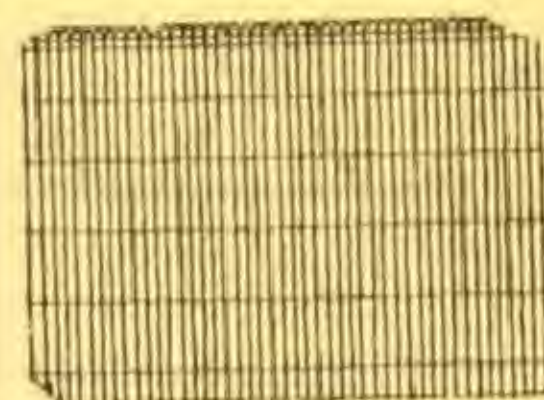
Driveway Gates are in five widths: 8, 9, 10, 11 and 12 ft., or larger if required.

## Erection

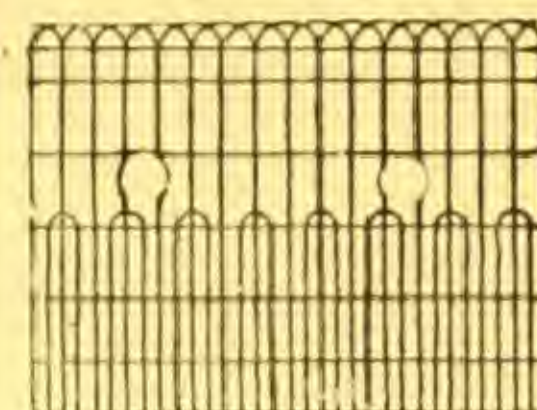
Can be carried out (though not necessarily) by our staff of workmen under the supervision of experienced fencing experts. When we supply the timber, we use all dressed jarrah timber. Gate and corner posts are 5 in. x 5 in.; top rail, 4 in. x 2 in. Intermediate posts, 5 in. x 3 in.; bottom plinth, 6 in. x 1½ in.

Boundary posts are drilled to take straining wires, which are put through and stapled off; the fabric fencing is then stapled to top rail, to bottom plinth and down intermediate posts.

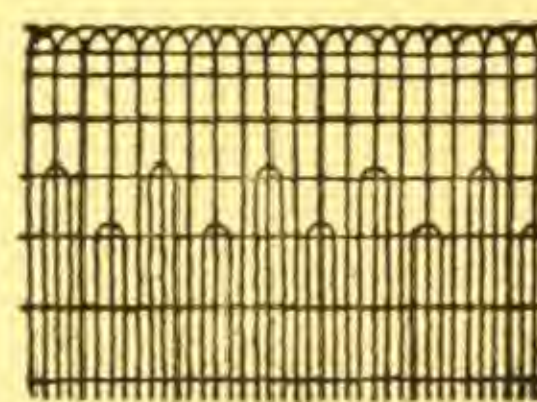
When ordering gates, give the width of gate openings, and we will send the correct size gate. We allow for hinges, catch, etc., when making the gate.

Fig. 153  
Chandler Garden Arch.

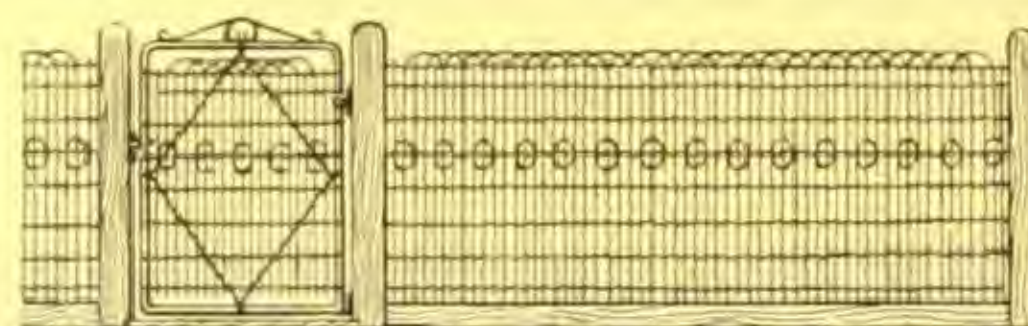
"E" Pattern



"F" Pattern



"FF" Pattern



"O" Pattern

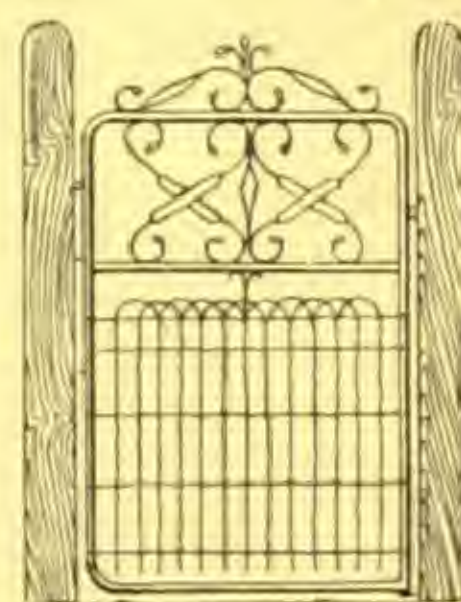
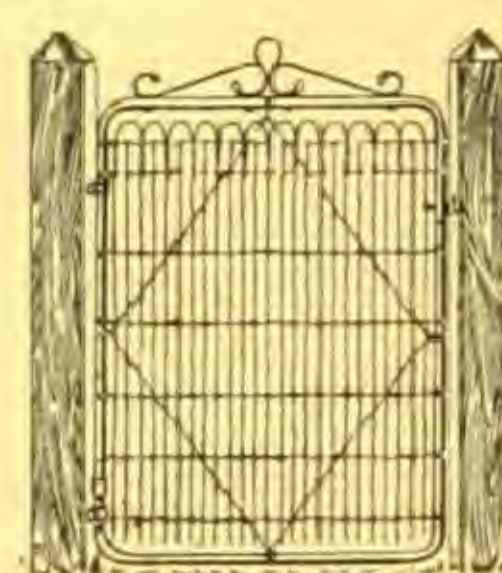
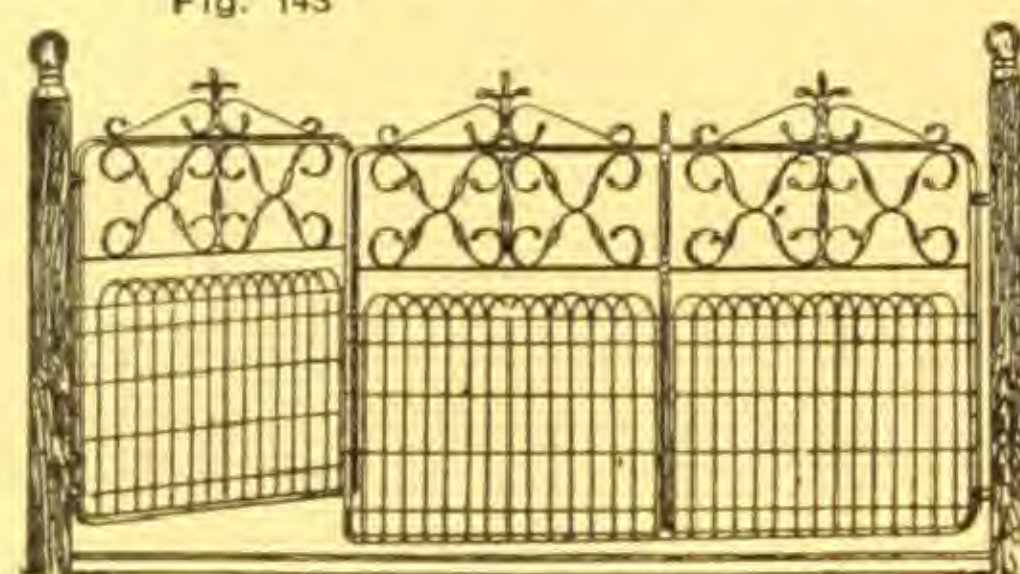
Chandler Hand Gate.  
Fig. 143Chandler Hand Gate,  
showing "E" Fencing.

Fig. 142.

(Continued on next page)



## CHANDLER CHAIN WIRE PRODUCTS



## Galvanised Chain Wire Work

**Chandler Chain Wire** is made of strong galvanised wire specially drawn for our own purposes. It is therefore practically everlasting and does not require painting. It is constructed of various gauges of wire and in different meshes to suit the purposes required.

## Uses

Chandler Chain Wire is used extensively for fences, tennis court enclosures; shop, machine and window guards; garden seats, etc. As fencing, its simplicity acts as a foil to the garden or home which it guards.

Table of Available Sizes,  
Gauges, etc.

A table of available sizes is given below:—

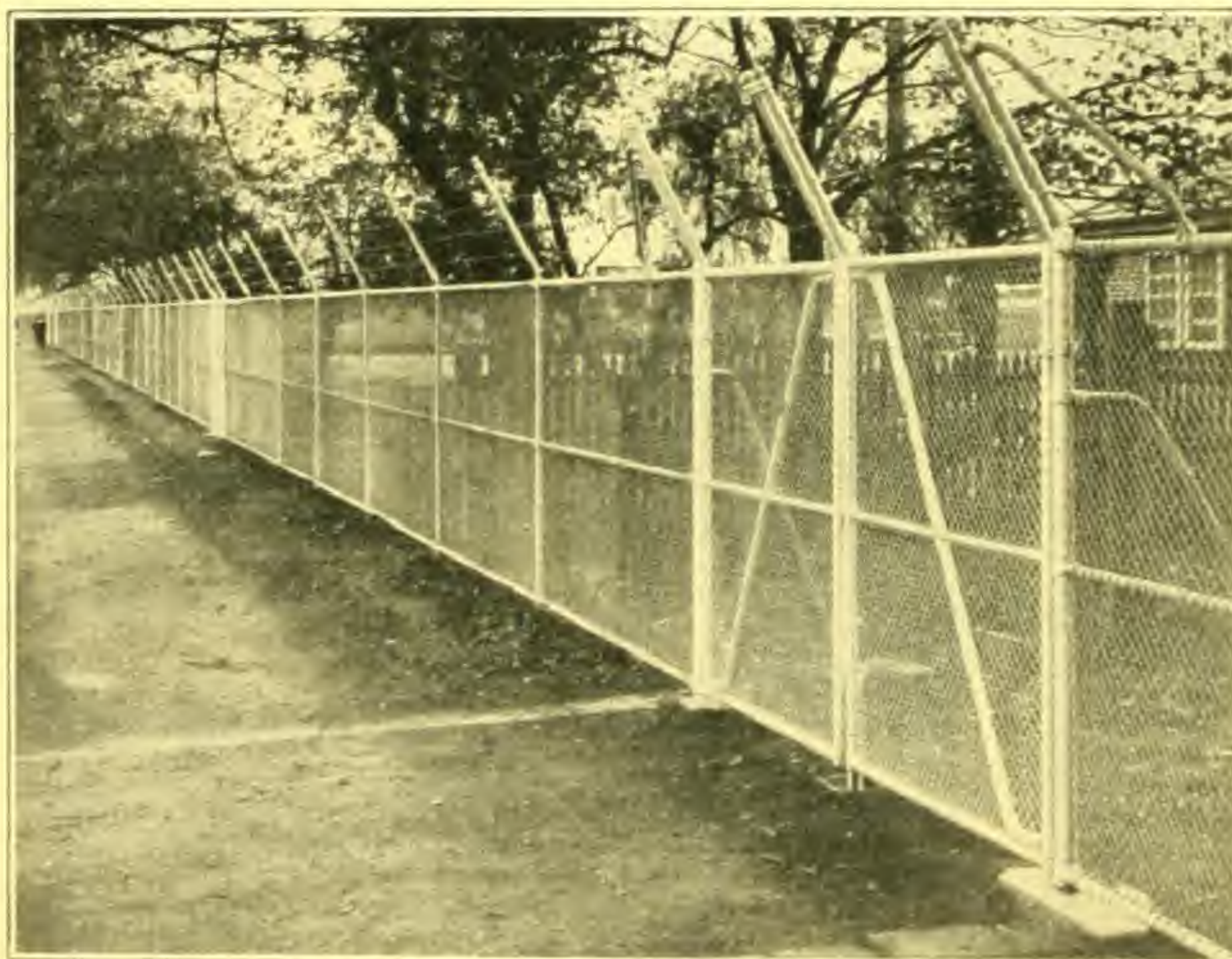
Mesh—Inches	1	1	1	1½	1½
Gauge	14	13	14	12	13
Mesh—Inches	1½	1½	1½	1½	2
Gauge	9	10	12	13	10
Mesh—Inches	2	2	3	3	4
Gauge	12	13	9	12	8

All the above are made in 36, 42, 48, 60 and 72 inch heights.

CHANDLER CHAIN WIRE is splendidly adapted for tennis court enclosures. Its advantages over wire netting lie in its strength and long life, as well as in its improved appearance.



Fig. 149.—Chandler Driveway Gate.  
Featuring Chandler Chain Wire and Scroll Work.



Chain Wire Fence, 900 feet long, manufactured and erected by us round the Amateur Sports Ground, Swan Street, Richmond. The chain wire is of 10-gauge and 1½-inch mesh, and the total height is 8 feet 6 inches.



Section of a special job, featuring  
Pipe Railing and Chain Wire of 14  
Gauge and ½ inch mesh.

(Continued on next page.)



## CHANDLER CHAIN WIRE PRODUCTS (continued)



Machine Guard, manufactured and erected by us for McLaren Pty. Ltd., Fitzroy, Vic.

## Erection

Chandler Chain Wire is laced on to pipe railing of 1 in. or whatever thickness is desired.

Where necessary, the pipes are concreted into ground, and in large fences the pipe posts are stayed at intervals.

Where Chandler Chain Wire is fixed to wooden railings, two methods are employed.

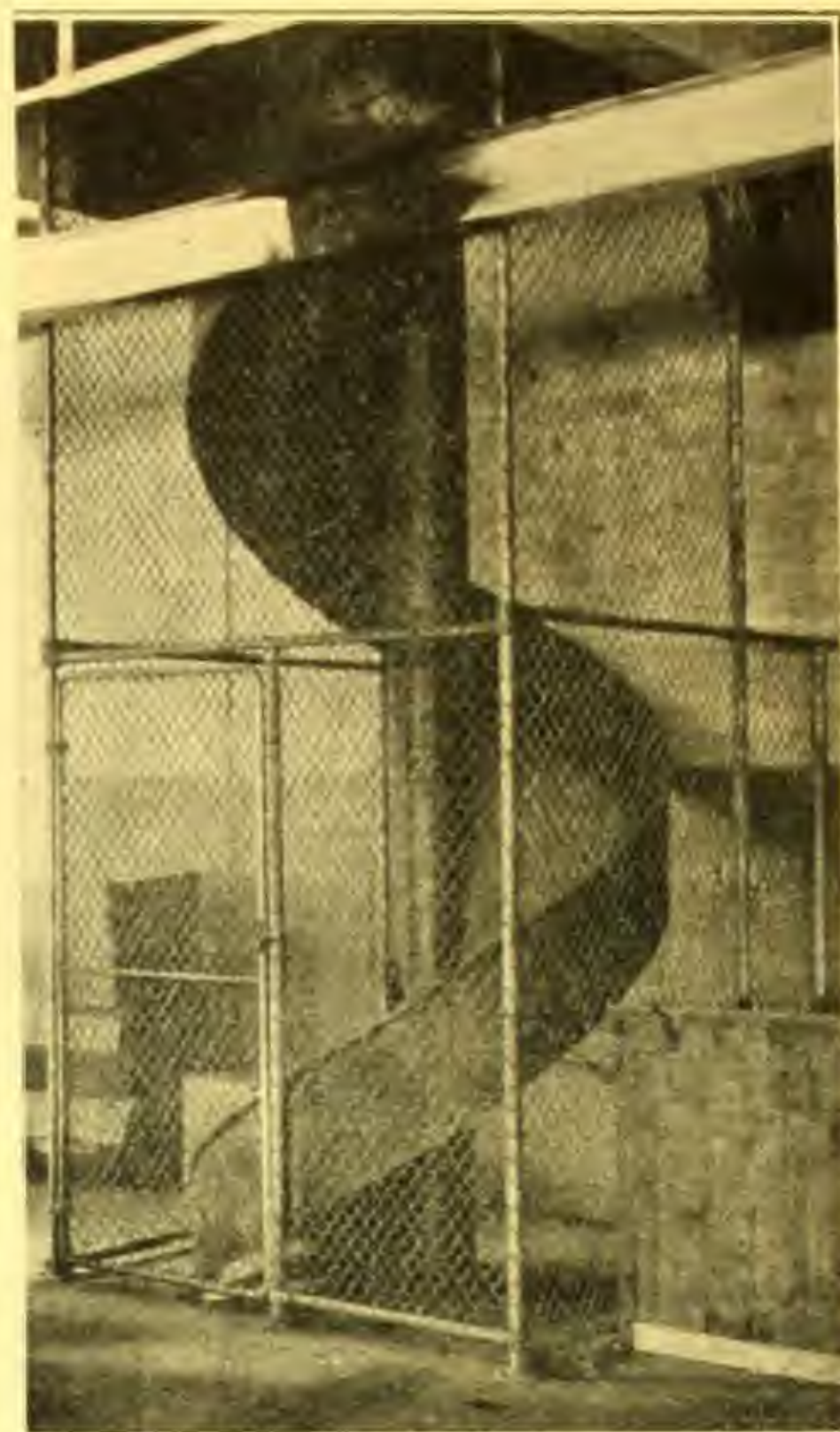
(1) The wire is placed into a grooved rail and nailed through.

(2) The Chain Wire is stapled into a top bevelled rail with a capping on top.

The first method is recommended as being more secure and more economical.

## Machine Guards

Machine Guards have flanges screwed into end of pipe, and these are screwed into wood floors or bolted into concrete floors. Shop guards are usually portable, and are padlocked for security.



Chute Protector, made and erected by us for the Dunlop Rubber Co. of Aust. Ltd., at their factory, Montague, Vic.

## CHANDLER SQUARE STEEL TUBE PRODUCTS

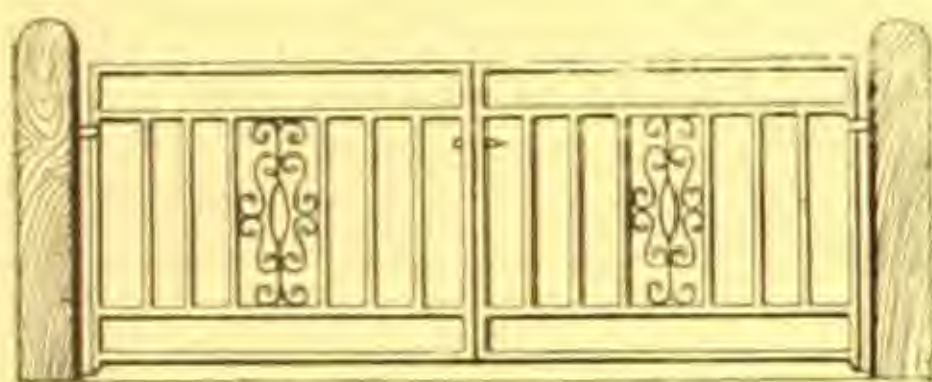
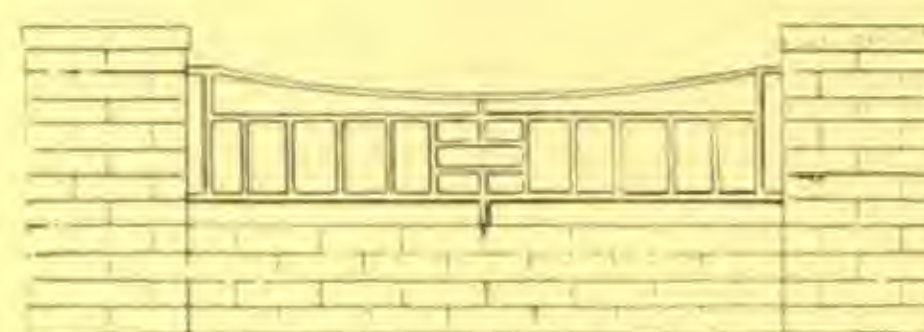


Fig. 198a.

Square Steel Tube Gates and Panels are all electrically welded. Outside panels are 1 inch square and inside tubing is  $\frac{1}{2}$  inch square. Gates are made to a standard height of 3 feet, but other sizes can be made to order. Panels are usually made in three heights, 12, 15 and 18 inches, though some special designs are made in one height of 24 inches.

Gates are made to match panels and vice versa.



Design 62.

As Chandler Square Steel Tube Work is one inch square, it has an appearance of boldness and strength. Although light, it is just as strong as ironwork.



Illustrating the splendid finish Driveway Gate, Fig. 104, gives to a charming home.

There is no straining of brick piers or timber posts with the light weight of Chandler Square Steel Tube Work.

(Continued on next page)



## CHANDLER MILD STEEL WORK

Mild Steel Gates and Panels are solid; as all joints are electrically welded, the work is very strong. Where the Panel is  $\frac{3}{8}$  in. square the inside work is  $\frac{1}{2}$  in. With Panel of  $\frac{1}{4}$  in. the inside work is  $\frac{3}{8}$  in. square, unless specially ordered.

Our Mild Steel designs embody the latest design ideas and are modern and artistic to a high degree.



Showing a special design which is featured in Hand Gate, Panels and Balustrading.

This was made for a modern block of flats in St. Kilda.

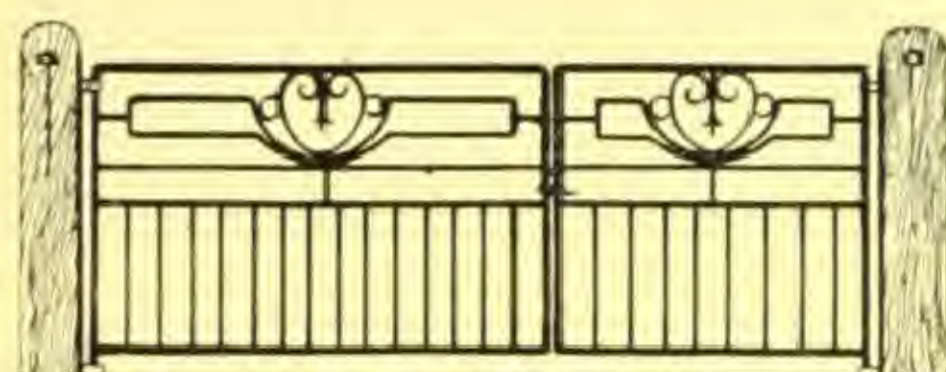


Fig. C.

## Gates

Are made 2 ft. 10 in. high, or 3 ft. above ground. Other heights are made to order. Widths are made as specified. They may be obtained with either equal or unequal leaves.

Special strong hinges have been made to securely hold the gates.

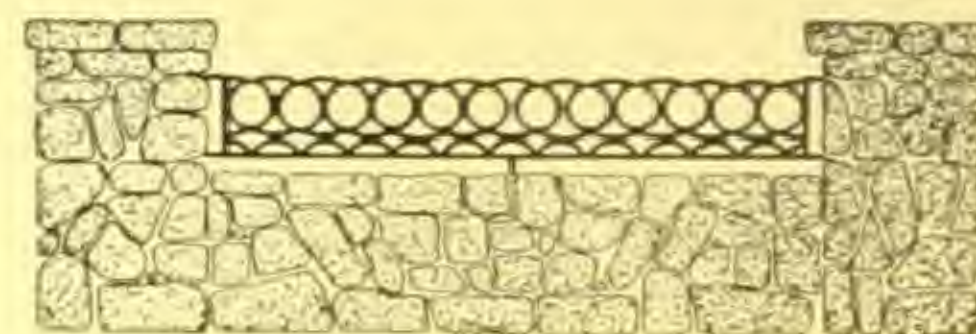


Fig. N.

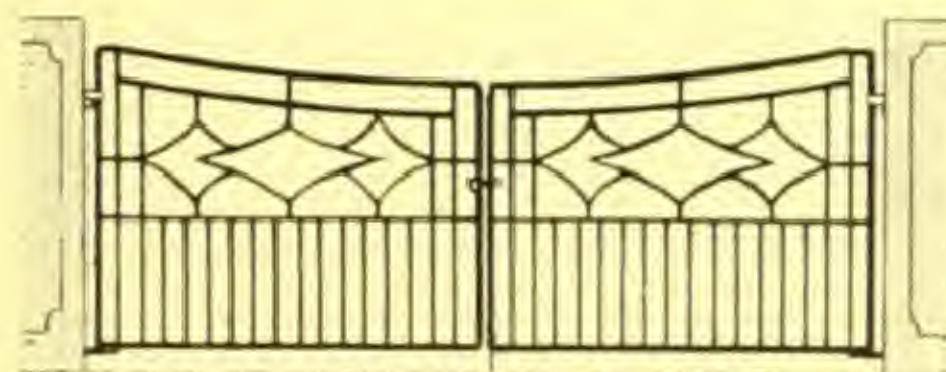


Fig. V.

## Panels

Are made 13½ in. high to suit brickwork, but other heights can be made.

The standard height of balustrading is 3 ft.

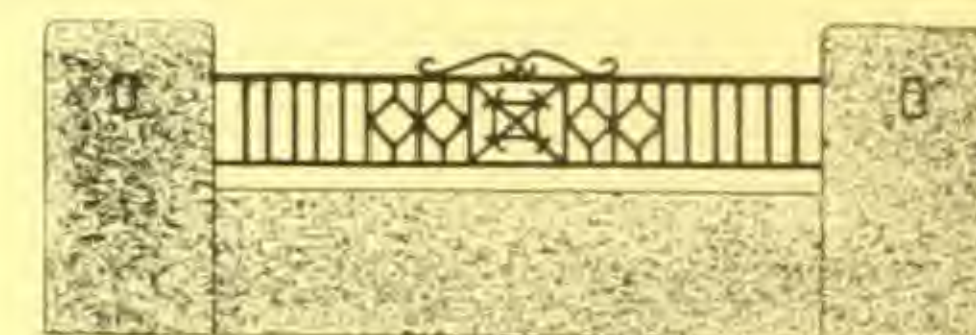


Fig. Q.

## Designs

Gates are made to match panels and vice versa.

Designs can always be made to suit your own ideas.



Illustrating Driveway Gate, Fig. C, with Matching Panel.

In addition to gates and panels we make Mild Steel Grilles for doors, windows and arches, and stair balustradings. These are made from stock designs or to your requirements.

(Continued on next page.)



## CHANDLER'S MILD STEEL WORK (Continued)

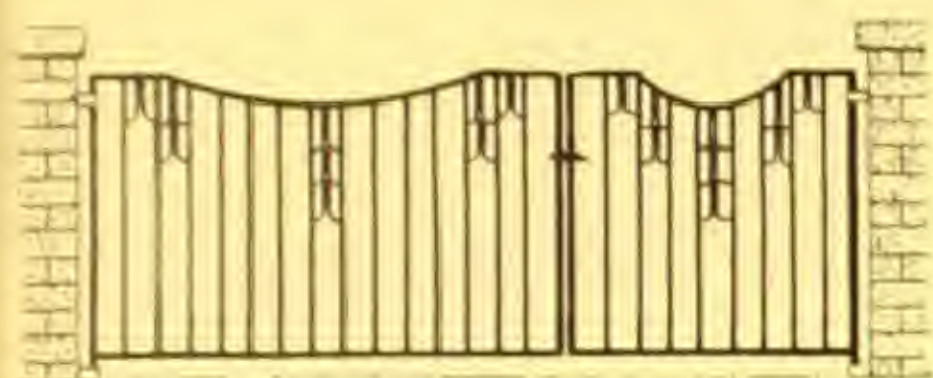


Fig. L.

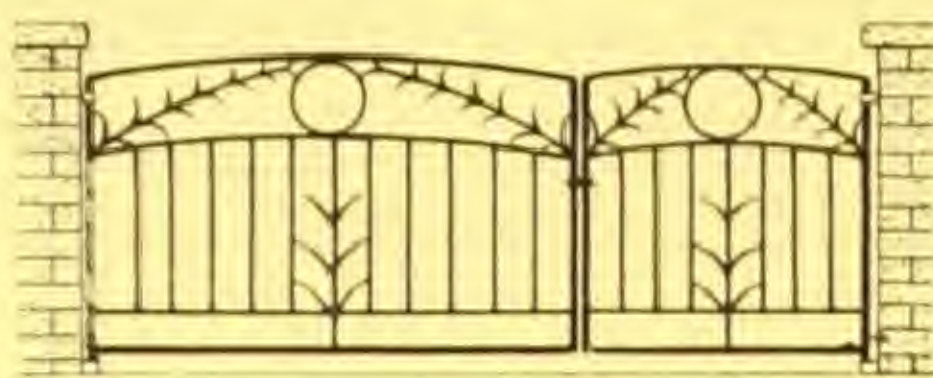


Fig. P.

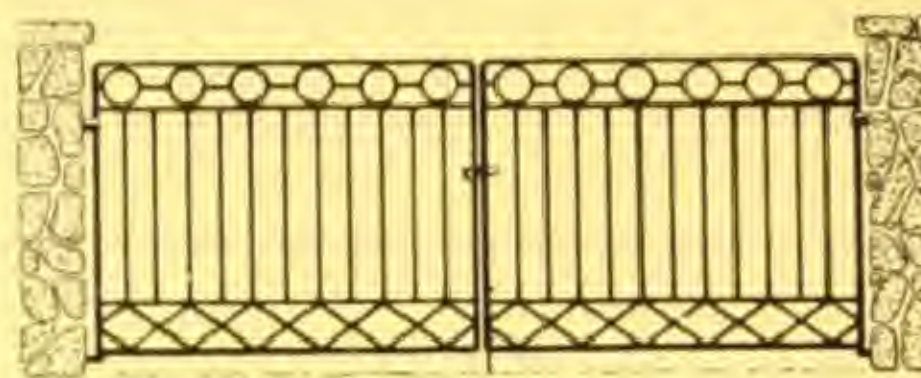


Fig. W.



When ordering gates of unequal leaves state which side the small gate is to hang, after looking at the gates from the street.

Always give exact distance between posts. State whether gate is to be hung on wooden posts or brick or concrete piers, so that we can send the correct hinges.

The beauty of design of these Gates and Panels (an adaptation of Fig. V) is well illustrated in this photo, of a home in Glen Eira Road, Caulfield.

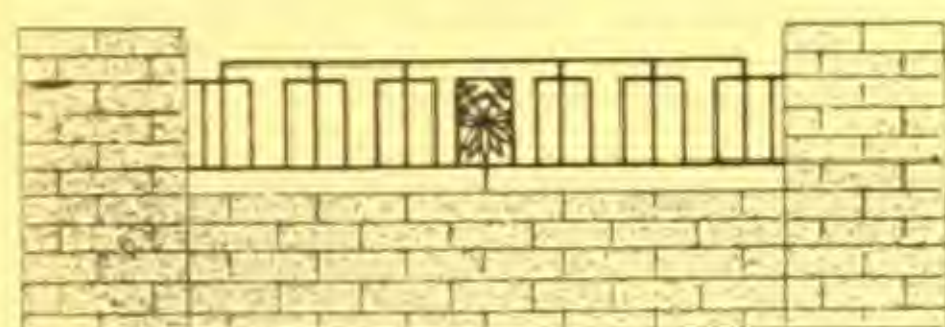


Fig. M.

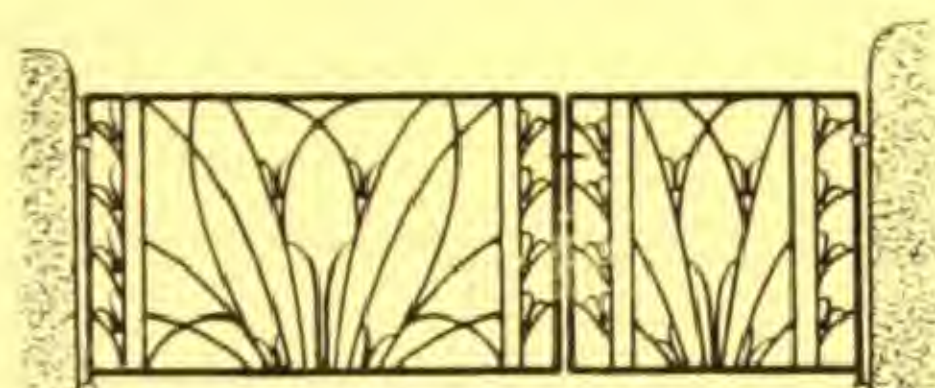


Fig. G.



Fig. O.

## INSTALLATION DATA

**GATES.**—Gate Hinges and Catches are standardised and are supplied with every gate. They are made of malleable cast steel and are practically unbreakable.

When erecting brickwork or concrete piers for gates the fittings are supplied to builder so that correct distances between bolts can be obtained, and these can be built in during construction of pier.

Brickwork bolts go through brickwork and turn down behind first brick.

The same applies to catches.

Hinges are made in 3 styles—No. 1 to fit round steel tube of gate frame; No. 2 to fit square steel tube work; No. 3 to fit mild steel gates.

Catches are made in 4 styles.

A.—Two-way catch for hand gate between posts.

B.—Ordinary one-way catch between posts.

C.—Back post catch.

D.—Standard catch for double gates.

**PANELS.**—We advise putting in panels while building the concrete or brick frontage. 3 in. lugs are left on each end of panel so that they fit well into pier.

This makes a better job, as otherwise, if the pier has been built, holes have to be drilled or holes left and the panels cemented in later on.



# HUME STEEL LTD.

Manufacturers of Electrically-Welded Steel Pipe, Concrete Lined and Welded Structures

Head Office:

"KINNEAR HOUSE," Cr. KING & LITTLE COLLINS STS., MELBOURNE. Tel. C.10754

Branch Offices:

South Australia: Mile End, Keswick.

Tel. L.5142-3.

West Australia: Subiaco. Tel. B.3642.

New Zealand: 8 Quay Street, Auckland.

Tel. 46-271.

Branches also in Singapore.

N.S.W.: Commercial Road, Rozelle, Sydney.

Queensland: Montague St., South Brisbane.

Tel. J.1442-3-4.

Tasmania: Cr. Dunn & Macquarie Streets,

Hobart. Tel. 1670.

14k

S.A.A. File No.

HUME

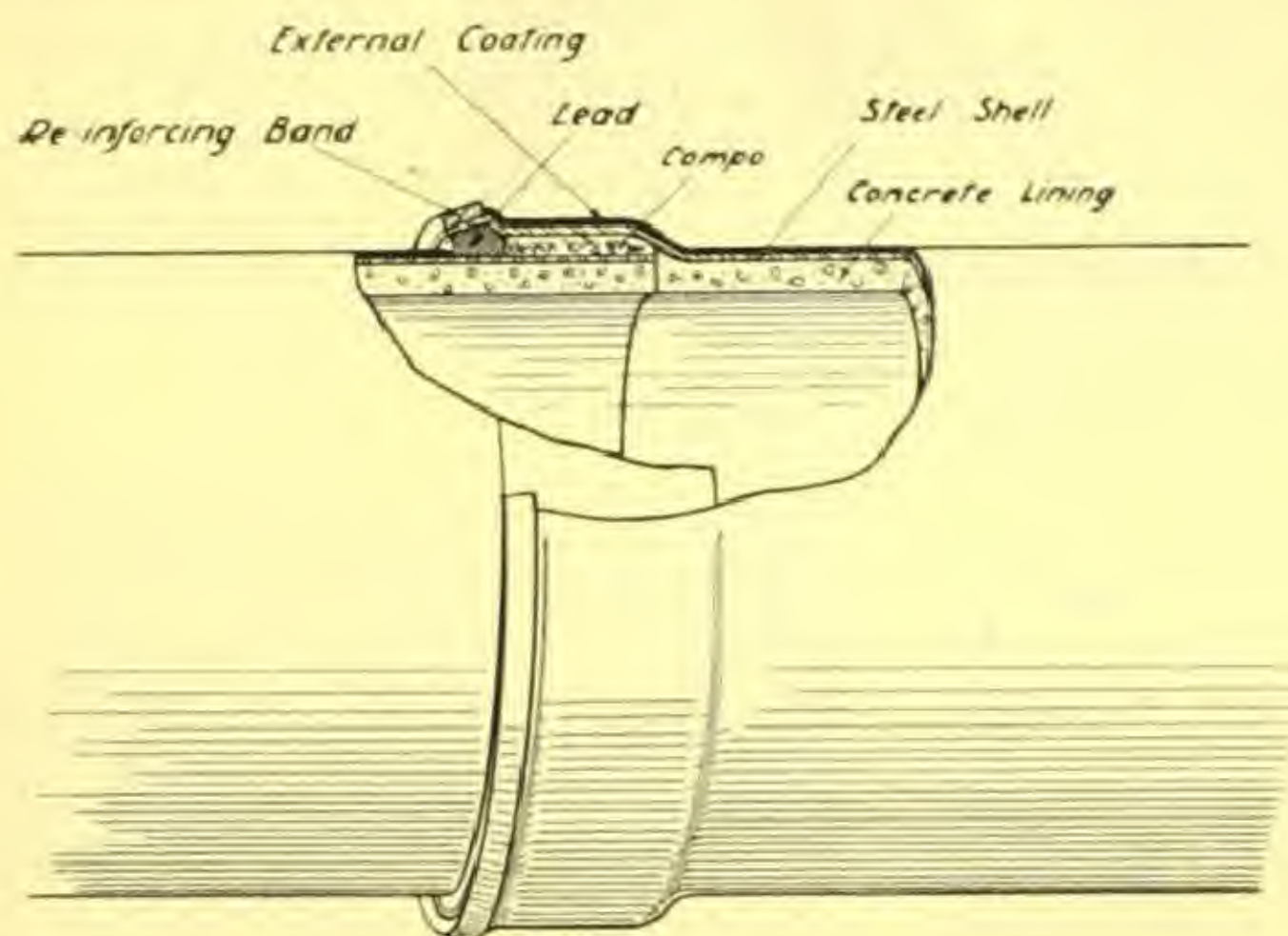
## MILD STEEL CONCRETE LINED PIPES

### Method of Manufacture

The Pipes are formed from Mild Steel Plates, the joining edges being butt welded by the "Hume" Electric Arc Welding process. The Mild Steel Plates (unless otherwise specified) have a tensile strength of 24 to 28 tons per square inch, with an elongation of not less than 20 per cent. "Hume" Covered Electrodes are used.

The Faucet is expanded on the end of the pipe, and is reinforced with a mild steel ring. The illustration shows details of end joint.

**External Coating.**—The pipes are externally coated with hessian and a mixture of bitumen and tar, which is "built" on to the Pipe by an improved process. The "Hume" external coating has now become standard throughout Australia.



Standard Lead and Yarn Joints may be made or, alternatively, Cement Compo and Lead Joints are adopted.

### Internal Lining

The Pipes are internally lined with cement concrete by the "Hume" centrifugal process. The thickness of the lining varies from one half inch to two inches, according to the diameter of the Pipe.

### Sizes

The Pipes are manufactured in diameters of 4 in. upwards, and are especially designed for the various services for which they may be required.

### Guarantee

Hume Steel Limited are able to guarantee their welded joints to be 100 per cent. efficient, with an elongation in the deposited metal of from 10 per cent. to 20 per cent. as may be required.

### Tests

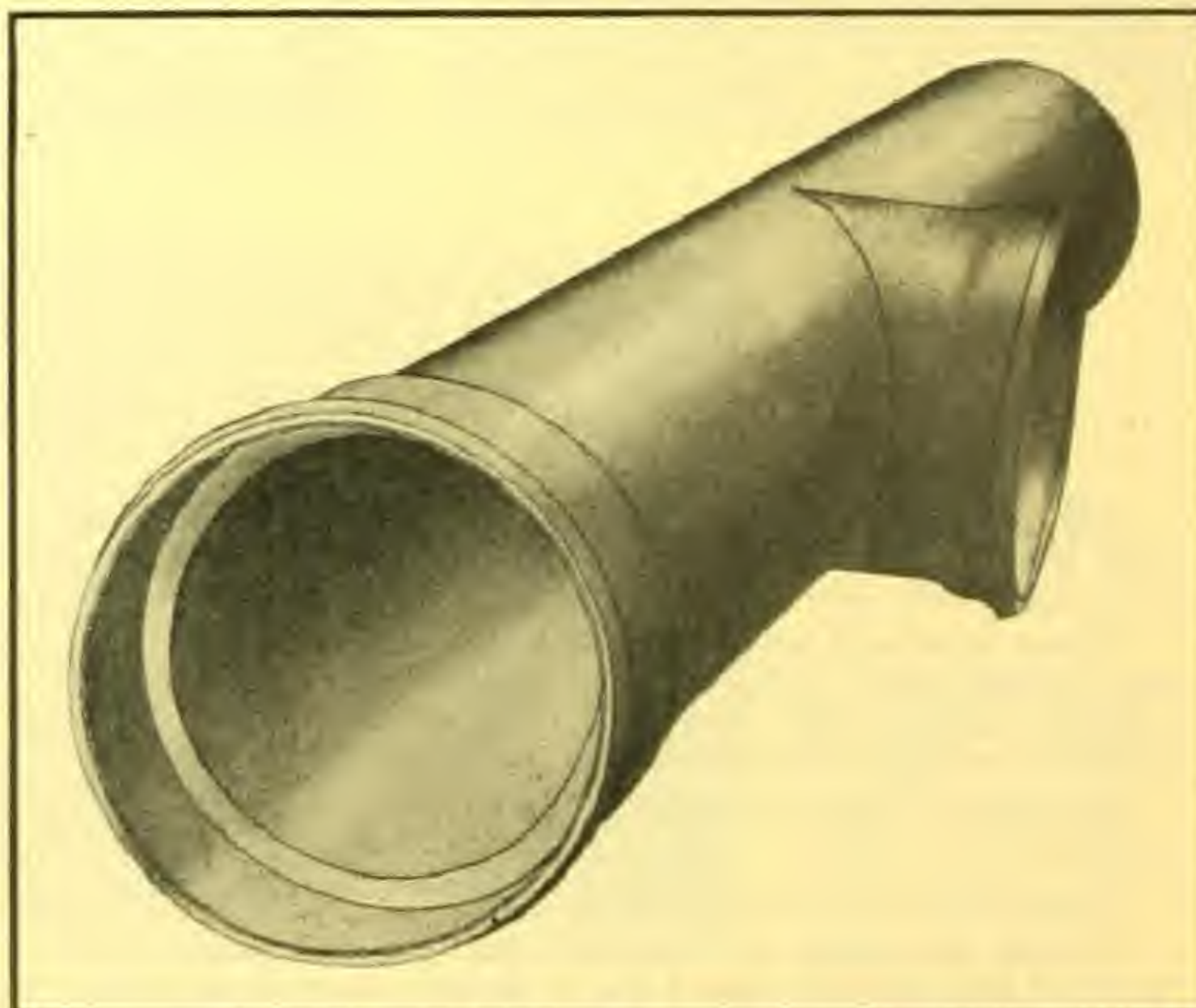
To show the efficiency of the Concrete Lining, a 9½ in. diameter Steel Pipe, manufactured from ⅜ in. mild steel plate, was lined with a ⅝ in. thickness of cement concrete. The steel was perforated with holes varying from half inch to one inch in diameter. The Pipe was then set up for hydraulic testing, and the pressure was gradually raised to 950 lbs. per square inch, which was the limit of the pressure gauge. The pressure was held for five minutes without change. This test conclusively showed that the Pipe would continue to give good service, even though, after a number of years, the steel shell had become perforated, due to corrosion or other causes.

### Quotations

Special Pipes of any shape, and suitable either for faucet or flanged joints, are manufactured as required. Write for further literature and information. Quotations should always be demanded, both for standard work or special requirements. Prices vary considerably according to the service for which the Pipe is to be used, and, as all Pipes are made to order, the quantity of Pipes required, regulates the price to some extent.

### Prominent Installations

Hume Steel Limited are Contractors to the Melbourne and Metropolitan Board of Works, Melbourne; Metropolitan Water Sewerage and Drainage Board, Sydney; Metropolitan Water Supply Department, Brisbane, Adelaide, Perth, Hobart and New Zealand; State Rivers and Water Supply Commission, Victoria; Irrigation Department, Adelaide; Irrigation Department, Brisbane; Goldfields Water Supply Department, Perth; also Country Water Trusts and Authorities throughout Australia.



Fauceted Branch.

[Continued on next page]



## ORNAMENTAL STEEL DEPARTMENT



## Patent Stud Weld

The photo shows a test piece of stud weld after it had been put in a vice and hammered till it bent and twisted, without any disconnection at the weld whatsoever. By means of the patented stud weld, for the use of which Hume Steel Ltd. hold exclusive rights, the two units have been actually fused into one homogeneous section. The strength of this patented weld is remarkable, and far exceeds that of any ordinary welded flush joint. It is used on all Hume Steel Fence Department products, unless otherwise specified. Flush welds may be produced, if so desired, by grinding the studs down flush with surface of the work.

## Steel Fence Panels

Unless otherwise specified, steel panels are manufactured in  $\frac{1}{2}$  inch square section M.S. Bar, arc-welded at all joints by Hume special patented process. Some designs have a top rail of  $\frac{3}{4}$ -inch square bar, or a  $1\frac{1}{2}$  inch x  $\frac{5}{8}$  inch half round hand-rail section. The standard designs of fences with gates complete are available for any frontages from 48 feet to 60 feet, within two days of order. Special designs can be supplied within nine days.

## Fixing Fence Panels

The panels are usually built into piers whilst these are in course of erection. Standard lengths are carried in stock to suit openings of 7 ft. 9 in. to 8 ft. 6 in. between piers. We will undertake erection of our products in any locality, whenever required. The work, however, is so extremely simple that the contractor is usually able to complete erection independently of our assistance.

## Gates

Manufactured of Hume Steel, stud welded, in attractive designs and of rugged strength, are obtainable for all purposes. They are properly proportioned and correctly made in all details. The following standard sizes of bars are used:—Outside bars,  $\frac{3}{4}$  in. square; internal bars,  $\frac{1}{2}$  in. square.

## Sizes

In applying for estimates or consultation service, measurements for gates should be given indicating the neat distance between the piers, and showing which half of the gate is required to open and which half is to be bolted. For standard double gates, allow for 8 ft. (or 9 ft.) opening between the piers. For single gates, 3 ft. 6 in. (or 4 ft.). Height of standard gates, 3 ft. from ground line to top bar. The hinges are set into brickwork at 30 $\frac{1}{2}$  in. from G.L. to C.L. of bolt of hinge. Single gate catches at 23 $\frac{1}{2}$  in. above G.L.



Concrete and Steel Fence erected in the Esplanade, St. Kilda, Victoria.

## Designs

Designs of gates to suit all requirements, such as hand-gates and drive-gates for residences; school gates; gates for parks, sports grounds, etc., etc., are ready for inspection by architects at any time. There is a wide selection of designs, period, modern and futuristic motifs, available. Whether ornamental or of simple construction, each model is eminently efficient in operation, and extremely durable. Estimates will be gladly given for the construction of gates according to special designs specified by the architect.

## Balustrading

Balustrading and handrails can be effectively produced by Hume Steel arc welding. Special designs to suit architects' requirements can be carried out. The balustrading in the illustration to the left is made up of the following sections:—Top rail,  $1\frac{1}{2}$  in. x  $\frac{5}{8}$  in. of a handrail section; remaining bars,  $\frac{5}{8}$  in. to  $\frac{3}{4}$  in. square section—the whole flush welded.



Balustrading with Fence to match—designed by Leslie J. W. Reed, A.R.V.I.A.—Armada, Melbourne.



	<b>CYCLONE</b>			
	<b>FENCE &amp; GATE CO. PTY. LTD.</b>			<b>FENCES</b>
<b>14k</b>	<b>Cyclone House</b>	<b>Turner House</b>	<b>Exchange Building</b>	
<b>S.A.A. File No.</b>	<b>Hardware Street</b>	<b>24 Jamieson Street</b>	<b>Pirie Street</b>	
	<b>MELBOURNE, C.1</b>	<b>SYDNEY</b>	<b>ADELAIDE</b>	

### Products

"Cyclone" Ornamental Gates and Fences, also Hand and Driveway Gates in Square Tube, Wrought Iron Panelling and Gates, Stairway and Balcony Balustrading, Balconettes, Chain Wire Fencing, Ring-Lock Farm and Station Fencing, Farm and Station Gates, Sheep Hurdles, Theatre and Shop Front Guards, Window Guards, Shop and Bank Grilles, Advertising Signs, Machine Guards, Factory Protection Fencing, Dog and Poultry Pens, Tennis Court Enclosures and Gates, Steel Posts, Garden Arches, Tree Guards, Flower Bed Guards, Grave Enclosures, Gate Fittings.

### Manufacturing Plant

The "Cyclone" Factories in Melbourne, Sydney and Adelaide are the largest and most comprehensive of their kind in the Southern Hemisphere. Modern production methods, ideal working conditions, expert workmen, and strict supervision combine to make "Cyclone" products as good as it is possible to get them.

### Trade Mark

The word "Cyclone" is the registered trade mark of Cyclone Fence and Gate Co. Pty. Ltd., and cannot legally be used except to denote goods manufactured by this Company. All goods bearing the "Cyclone" trade mark are guaranteed against any defects in manufacture.

### Ornamental Fabric Fences and Gates

"Cyclone" Fabric Fences make admirable frontage fences for suburban or country homes, parks, public gardens, etc. They are graceful and strong, and enhance the appearance and value of any property. In addition, they are inexpensive to erect and cost practically nothing to keep in order and repair. Made of the best galvanised wire procurable.

"Cyclone" Ornamental Gates will not sag or be affected by the weather. They can be had in many designs, or, in the case of wrought-iron gates, made to architects' and builders' own designs.

### Chain Wire Fencing and Guards

"Cyclone" Chain Wire is strongly woven of special rustproof, galvanised wire, manufactured in any mesh from  $\frac{1}{2}$ -inch to 4 inches, and in any gauge from 16 to 6. It can be erected on wooden or tubular steel posts, with wooden or metal pipe rails and plinth. Being rustproof and unbreakable, it needs no maintenance. It is highly recommended for Factory Fencing, Machinery Guards, Playground Fencing, School Fencing, Tennis Enclosures, etc.

### Catalogues and Price Lists

Complete information regarding all "Cyclone" products is given in our finely illustrated catalogue, copies of which will be gladly supplied on request.

## WROUGHT IRON WORK

### Design and Construction

All "Cyclone" work is designed and constructed upon sound engineering principles, the materials in every case being the best it is possible to secure, and the workmanship being carried out with that attention to detail and finish common to all "Cyclone" products. All joints are electrically welded, and each panel or gate is, therefore, a solid piece of metal, strong and lasting, as well as pleasing to the eye. "Cyclone" panels are made to allow two inches between panel and pier or post. It is advisable that (1) Panels should not be more than 9 ft. in length; (2) Where panels are to be used with brickwork or stone they should be on hand before the work is started for the purpose of being built in; (3) Gate fittings for brickwork or stone should always be built in with the job.

### Designing Services Available

Many standard stock designs are always available, but work to the special designs of architects will always be carried out with pleasure. Telephone for a trained and specially qualified representative of the Company to discuss any special work required. He will submit suggestions and designs. We have the technical staff, and invite you to make use of it at any time without obligation.



A typical "Cyclone" electrically welded joint.

### The Test

With the end B locked in a vice, the cross-piece AC was twisted completely around once. Then, with the cross-piece AC held in the vice, the section B was bent over from the weld to an angle of 35 degrees. In spite of this, the weld showed no sign whatever of fracture.

(Continued on next page)





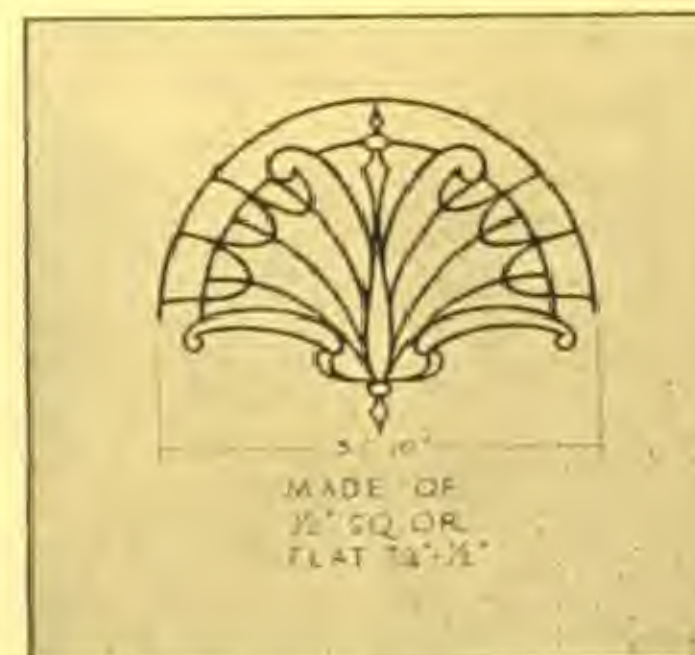
Style No. PY 65.

Technical drawing of a fence section. The drawing shows a fence with vertical bars and a decorative scrollwork section. Dimensions and material specifications are provided:

- Top rail:  $1\frac{1}{2}" \times \frac{1}{2}"$  Half Oval
- Barrels:  $4\frac{1}{2}" \times \frac{3}{8}"$
- Spacings:  $6"$  Centers
- Bottom rail:  $1\frac{1}{2}" \times \frac{3}{8}"$
- Post:  $5\frac{1}{2}" \times 5\frac{1}{2}"$
- Height:  $7\frac{1}{2}'$

Style No. PY 69.

Style No. BY 46.



Style No. PY 64.

## INTERNAL AND EXTERNAL GRILLE

RAMSAY'S CATALOGUE





Set of square tube and wrought iron gates supplied to the Dandenong High School. Each of the two centre gates has the school monogram worked into it.



Grille in oxidised finish erected in a city office. Constructed of square steel tube and wrought iron to architect's own design.



Stairway  
Balustrade  
and  
Switchbox  
Doorway  
Grille.



The illustration above shows front gate, porch gate, and balconette manufactured and erected to the specification of a Melbourne architect.



Photograph of Wrought Iron Panels (Style P.V.1) with Driveway Gates (Style G.41) to match. This is a simple but effective design. The specifications are:—2 in. square iron throughout. Height of Panels, 21 in. Height of Gates, 36 in.



# RYLANDS BROS. (AUST.) LIMITED

(An Allied Industry of B.H.P. Co. Ltd.)

NEWCASTLE, N.S.W.

WIRE MILLS: NEWCASTLE, N.S.W.

Offices:

SYDNEY — ADELAIDE — MELBOURNE — PERTH — BRISBANE

"WARATAH"  
WIRE  
AND  
WIRE  
PRODUCTS

14

S.A.A. File No.

## PRODUCTS

**Motor Passes**—5, 10 and 20 ton Main Road types; 5-ton Inter-Paddock type. Stands for Main Road Passes.

**Steel Fence Posts**—"Waratah" B.H.P. Star Section—Black, Varnished and Galvanized.

**Fencing Wire**—Galvanized, Black, Varnished, High Tensile Galvanized, Patented High Tensile Galvanized.



**Barbed Wire**—Iowa, Waukegan and Glidden patterns in all gauges.

**Wire Netting**—Rabbit-proof, Sheep and Dog-proof, Poultry. All miscellaneous sizes.

**"Waratah" Fence**—(Hinged Joint) Galvanized. Ordinary and High Tensile qualities.

**"Flexo" Droppers**—Galvanized.

**Chain Mesh**—Crapo Process, Galvanized.

## "WARATAH" MOTOR PASSES

### Manufacture

"Waratah" Motor Passes, made from B.H.P. steel, have been introduced to provide reliable equipment of ample strength to take the place of make-shifts. They are constructed of steel rails and girders, and are finished in aluminium paint. The standard designs are used as by-passes for motor traffic alongside gates across roadways, and the special design passes are for use in the line of the road where motor traffic is heavy, the usual gate being erected alongside as a by-pass for stock.

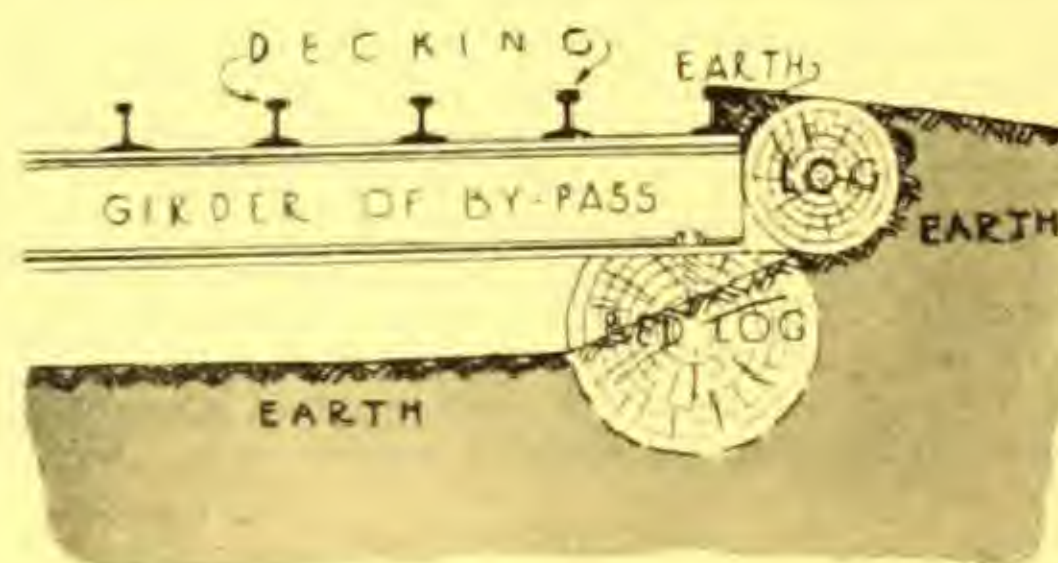
### Special Features

- No gates to open.
- No speed limit. Cross at any speed, as you would a culvert.
- Stock and Rabbit proof.
- All steel, Fire and White Ant proof.
- Having no wheel tracks, motor vehicles can drive over any part of the full width.
- Nothing to wear out or come adrift; no short sections bolted together—just a complete massive unit.



"Waratah" 20-50 Ton Pass on Steel Stand.  
Total Weight, exclusive of Stand, approx. 1 Ton. Weight of Heaviest Unit, 200 lbs.

Types.	Size.	Axle Load in Tons.	
		Normal.	Emergency.
Main Road (heavy)	10ft. x 6ft.	20	50
Main Road (standard)	9ft. x 6ft.	5	8
Inter-Paddock	7ft. x 4ft. 6in.	5	
Inter-Paddock	7ft. x 3ft.	5	



Cross Section showing Method of Erection Without the Use of Supporting Stands.

## "WARATAH" STAR SECTION FENCE POSTS

This type of post marks a new development in steel fencing. It is exceedingly rigid, is protected from rust by a heavy tenacious weather-resisting black varnish or galvanizing, is fireproof, and eliminates the labour of post-hole digging, the posts being simply driven where required, a driving cap being used if ground is very hard.

"Waratah" B.H.P. Star Section steel posts are carried in stock in 5 ft. and 5 ft. 6 in. lengths, and bored to standard spacings, though the posts may be bored to any spacings. Standard spacings:—Top of post to first hole, 1 in., then 6 in., 6 in., 8 in., 6 in., 5 in., 5 in., 6 in.

No extra charge is made for special spacings in quantities of 100 and over. "Waratah" B.H.P. steel

posts are the strongest on the market. A post laid on supports 4 feet apart withstood concentrated load of 330 lbs. in the centre without bending. A load of 640 lbs. was required to bend the post 3 inches. These posts are made from B.H.P. high carbon steel and are supplied black, varnished, or galvanized.

### AVAILABLE SIZES.

Standard Lengths—							
4ft. 6in.	5ft.	5ft. 6in.	6ft.	6ft. 6in.	7ft.	7ft. 6in.	
Approx. Wt. per Bundle of Ten in lbs.—							
55	62	69	74	80	86	92	

(Continued on next page)



**"WARATAH" FENCE WIRE**

The Newcastle wire plant is the largest in the Southern Hemisphere and is also one of the most comprehensive in existence. Available wires of various types, tempers and finishes are briefly stated below.

**Plain Galvanized.**—In all gauges, 4 to 14 I.S.W.G. Hard, medium, and soft temper. In hundredweight coils.

**"Waratah" Galvanized Fencing Wire** is made from specially selected steel carefully processed and galvanized by the hot process with pure electrolytic zinc.

**Black Varnished.**—In all gauges, 4 to 14 I.S.W.G. Hard, medium, and soft temper. In hundredweight coils.

**"Waratah" Black Varnished Fencing Wire** is made from the same steel as Galvanized Fencing Wire, and is treated with black weather-resisting varnish.

**High Tensile, Galvanized.**—In hundredweight coils. All High Tensile Wire is made from selected high strength grade steel, hot galvanized with electrolytic zinc, and every coil is tested for breaking load.

**"Waratah" High Tensile Wire** is made in the following grades:—

**Ordinary Quality**—12½ gauge—850, 1,050, 1,140 lbs. breaking loads.

**"Tyeasy" Patented Quality**—12½ gauge—1,250 lbs. breaking load. 14 gauge—700 lbs. and 850 lbs. breaking load.

**"WARATAH" GALVANIZED BARBED WIRE**

Gauge.	Approx. length per cwt. yds.	Approx. weight per mile. lbs.	Approx. breaking load in lbs.
<b>IOWA PATTERN</b>			
12	460	429	1,140
13	560	352	915
14	670	294	675
<b>WAUKEGAN PATTERN</b>			
12½	620	318	1,020
14	880	229	650
14*	930	212	650

\*Waukegan Long Distance.

Glidden Pattern to special orders.



"Waratah" Barbed Wire is wound on wooden reels containing 1 cwt. net weight.

**"WARATAH" CHAIN MESH (CRAPO GALVANIZED)**

Manufactured from Crapo processed galvanized steel wire, which is particularly suited for this fabric, as the Crapo process insures an extra heavy coat of galvanizing which will not crack or flake, even though the wire be bent at right angles, or wrapped around its own diameter. Rylands Brothers (Aust.) Ltd. hold the sole manufacturing rights of Crapo Process Galvanized Wire.

**"Waratah" Chain Mesh** is made in all widths up to 9 ft., and in standard meshes from 1½ in. to 3 in.

**"Waratah" Chain Mesh** may be supplied with a woven-in selvedge wire, giving great strength and making the mesh particularly suitable for road-guard purposes, or it may be finished with one of the other forms of edges illustrated in Figs. 2 and 3.

**Uses**

Fencing of all descriptions, Machinery Guards, Road Guards (absorbs impact of out-of-control vehicles), Screens for grading materials, Enclosures for Switchboards and Electrical Gear, Barriers for Tool Stores, Display Racks, etc.

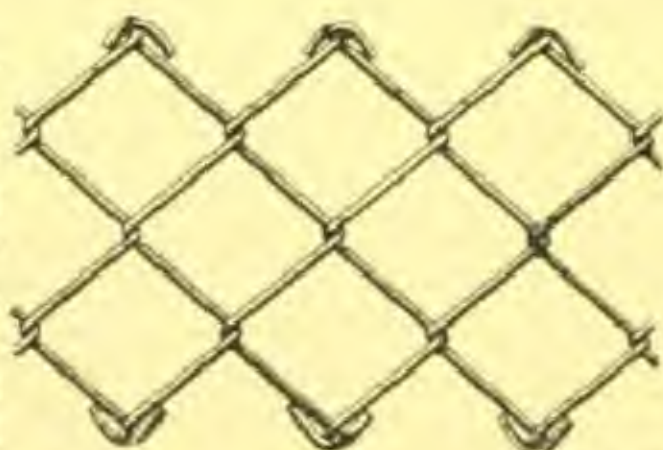


Fig. 1.

Fig. 2.



Fig. 3.

**"WARATAH" WIRE NETTING**

"Waratah" Wire Netting is guaranteed straight and flat, and is wrapped in black waterproof paper whilst in store. It is carefully woven from the most suitable wire and hot galvanized after weaving with pure electrolytic zinc. Every coil bears the maker's identification tags, as illustrated on this page. "Waratah" Wire Netting is supplied in 50 and 100 yard rolls, except ½ in. and ¾ in. meshes, which are supplied in 25 and 50 yard rolls. Rabbit, Sheep and Dog Netting is usually supplied in 100 yard rolls, and 2 in. Poultry and Miscellaneous Netting in 50 yard rolls.

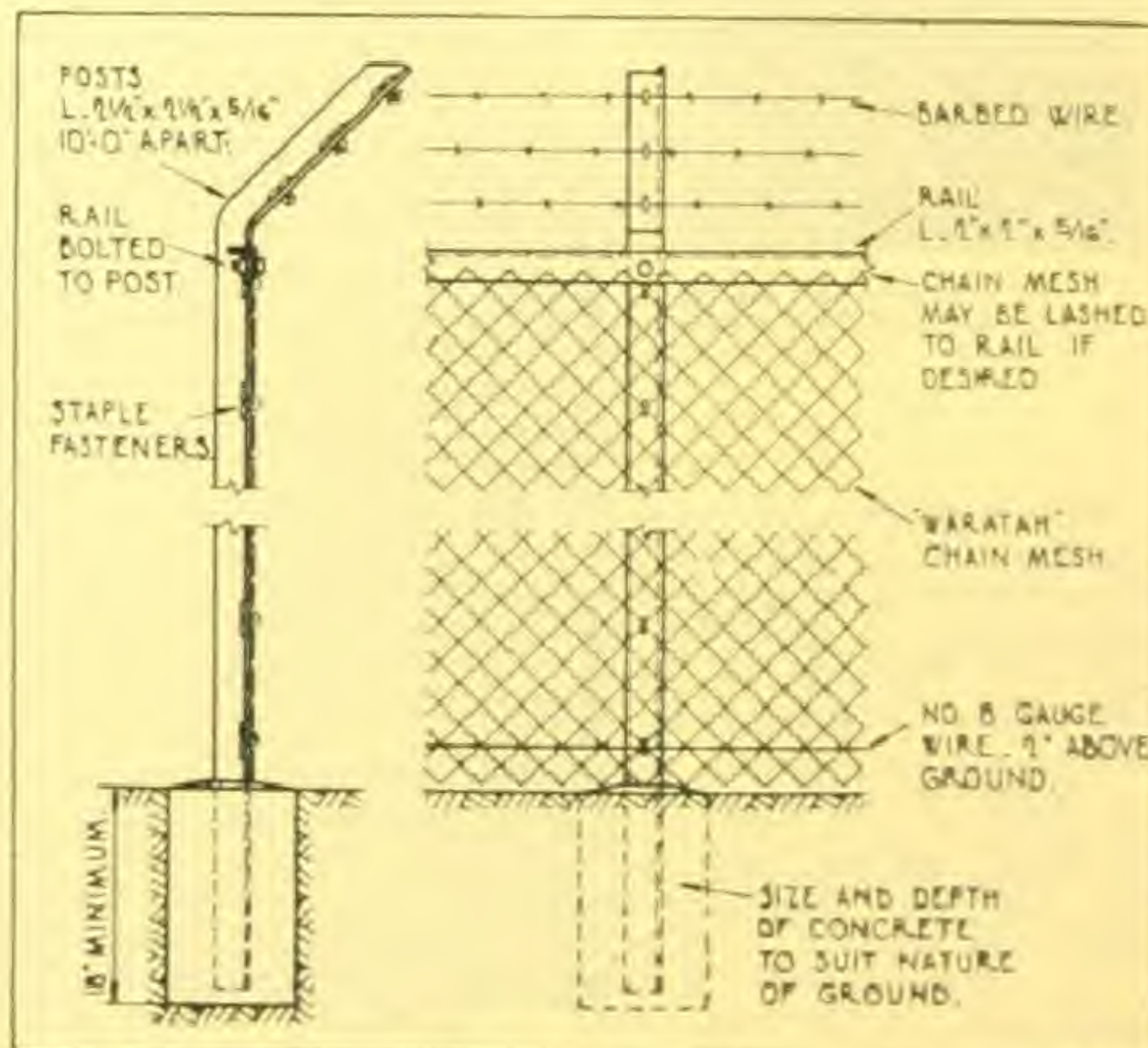
**Available Widths, Meshes and Gauges**

Mesh, Inches.	Widths, Inches.	Gauges.	Remarks.
½	6 to 72	19, 20, 22	Usual gauge, 22.
¾	6 to 72	18, 19, 20, 22	Usual gauge, 20.
1	6 to 72	17, 18, 19, 20	Usual gauges, 19 and 20.
1½	6 to 72	16 to 19	Standard Rabbit Netting in A and B qualities, 36 and 42 in. widths, 17, 18 G. Ditto; also mesh in 17A quality for tennis courts.
1¾	6 to 72	16 to 19	Little used.
2	6 to 72	14 to 19	Standard Poultry Netting; also in 16 and 17 G. for tennis courts.
2½	12 to 72	14 to 19	Little used.
3	12 to 72	12 to 19	30, 36 in. widths, 16, 17 gauge are widely used; suitable for sheep and dogs.
4	12 to 72	12 to 18	Ditto.

Note.—"A" and "B" denotes heavy and light sizes of the same gauge—not first and second quality.

**Methods of Fixing**

"Waratah" Chain Mesh may be fixed to wood and pipe framing by employing the usual methods of fixing. When fixing to "Waratah" Star Section Fence Posts, galvanized staples are used. The method of fixing and erection illustrated below ensures a rigid, strong and permanent fence suitable for most industrial purposes.





## SECTION F

[Containing S.A.A. Filing Sections Nos. 15, 16, 17 and 18]

## ORNAMENTAL METAL WORK

— and —

METAL DOORS AND  
WINDOWS



# MONEL METAL

A PRODUCT OF THE INTERNATIONAL NICKEL CO. INC.

AUSTRALIAN DISTRIBUTORS:

FERRIER &amp; DICKINSON LTD., 26 CLARENCE STREET, SYDNEY.

VICTORIA AND TASMANIA:

H. Perks & Co. Pty. Ltd.,  
31 Queen Street, Melbourne, C.1.

SOUTH AUSTRALIA:

Alwin Fisher Ltd.,  
17 Flinders Street, Adelaide.

QUEENSLAND:

W. E. Peterman,  
160 Edward Street, Brisbane.

WESTERN AUSTRALIA:

Harris, Scarfe & Sandovers Ltd.,  
Hay Street, Perth.

15g

S.A.A. File No.



## What Monel Metal Is

Monel Metal consists of approximately 67 per cent. Nickel, 28 per cent. Copper, and 5 per cent. other metals. In appearance it is very similar to pure nickel; it takes the same high finish, and has a slightly softer and somewhat more silvery lustre. It is strong, tough, ductile, and far superior to copper, gun-metal and bronze under corroding influences. It machines readily, and can be rolled, drawn, cast, forged, soldered, brazed, and acetylene or electrically welded. In rolled form, the metal has a tensile strength of 30 to 42 tons per square inch, according to size and treatment, e.g., whether in Rod, Strip, Wire or Sheet form.

The remarkable combination in the same alloy of a steel-like strength and a high resistance to corrosion, has led to the use of Monel Metal in many fields where it has had to withstand numerous corroding agencies under varying conditions of temperature, concentration and immersion.

Monel Metal is a natural alloy in that it is produced from its ore without separating the constituent metals. The ore is mined, smelted, and refined in Canada, under technical control by the International Nickel Co.

## Special Value of Monel Metal

This arises from the combination of several qualities, each of great importance in itself:—

1. A high tensile strength exceeding that of mild steel.
2. Extreme toughness, equal to that of wrought iron.
3. The proportion of strength retained at high temperatures.
4. A complete resistance to the corrosive action of brine and impure waters, atmospheric conditions, alkalies, and a high resistance to many acids.
5. The facility with which it can be worked by ordinary engineering processes.
6. The varied forms in which it is readily available.
7. A highly ornamental and decorative appearance combined with durability and cleanliness.
8. The non-tarnishing properties of this metal are an attractive feature in its use for decorative metal work.

## Resistance to Corrosion

Owing to the varying conditions under which metals are used in chemical operations, it is misleading to give definite figures for corrosion as obtained in the laboratory. Under practical working conditions, Monel Metal has been

proved resistant to most acids and alkalis in common use, but it should be noted that Monel Metal is **not** recommended for the following:—

Chromic Acid	Perchloric Acid	Sulphurous Acid
Nitric Acid	Mercuric Chloride	Saturated Ammonium-Nitrate Solution
Picric Acid (hot)	Phosphoric Acid (hot)	
Copper Sulphate		

## PHYSICAL PROPERTIES OF MONEL METAL

Colour—White.

Melting Point—1,360 deg. C (2,480 deg. F.).

Specific Gravity—8.80.

Weight per cubic inch—0.320 lbs.

Coefficient of Thermal Expansion per degree C.—

(25 deg. C.—100 deg. C.)—0.000014.

(25 deg. C.—300 deg. C.)—0.000015.

(25 deg. C.—600 deg. C.)—0.000016.

Electrical Resistivity—256 ohm-mil-foot; 42.5 microhm-cm.

Electrical Conductivity—4 per cent. of that of Copper.

Coefficient of Electrical Resistivity—0.0019 per deg. C.

Optical Reflectivity—60 per cent. of that of Silver.

Heat Conductivity—0.05 G.G.S. Units (1/15 of that of Copper).

Specific Heat—(20-1,300 deg. C.) 0.127 cal. per gram. per C.

Magnetic Induction at 100 gauss:—

Cast Metal—500 gauss.

Rolled Metal—1,000-1,500 gauss.

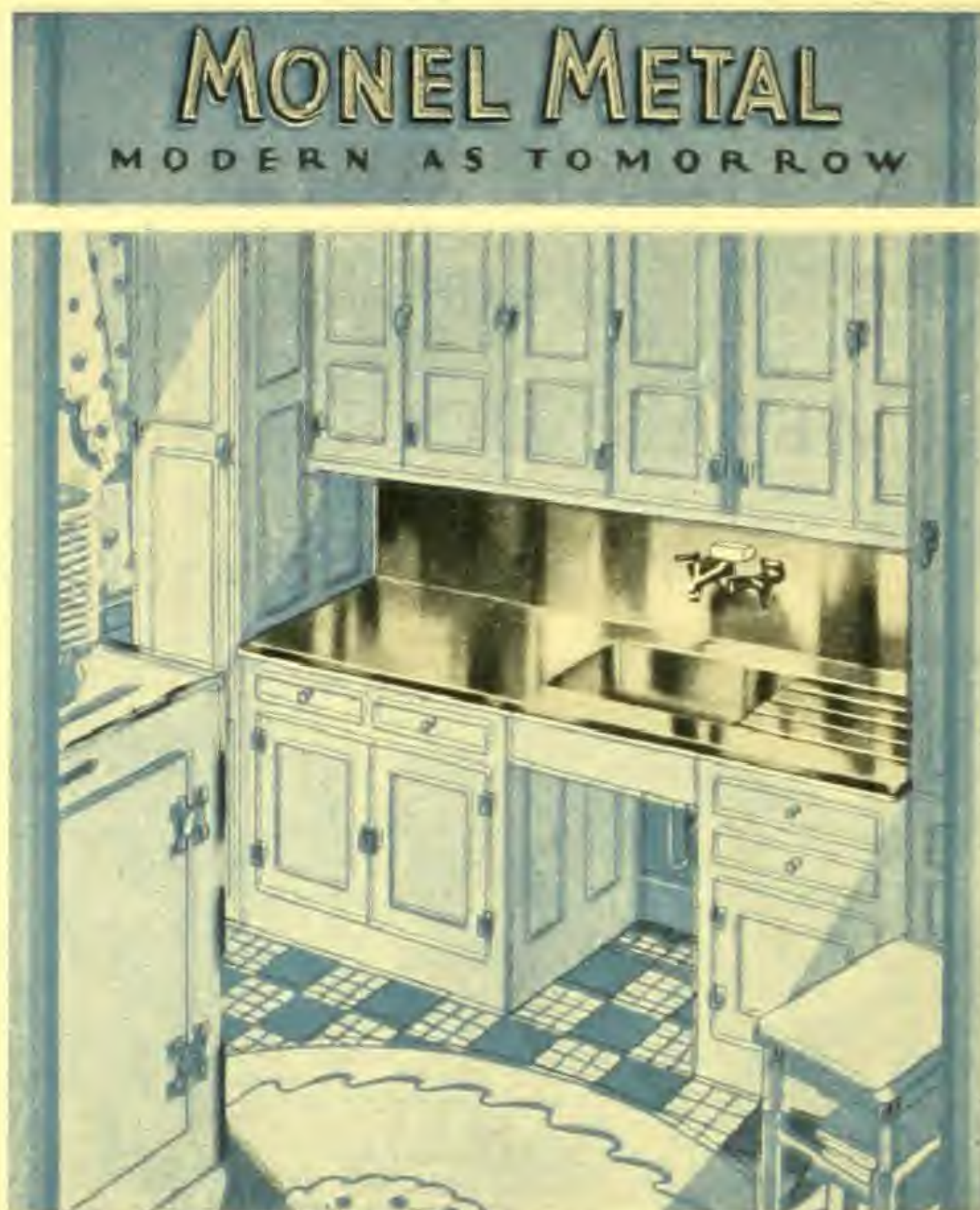
Modulus of Elasticity (Youngs)—25,000,000.

Torsional Modulus—9,500,000.

Izod Test—100 ft.-lb. on standard specimen.

Resistance to alternating stress in rotating beam machine—approx: 100,000,000 alterations at proportional limit.

(Continued on next page)





### How Obtainable as Raw Material

Monel Metal can be obtained from Australian stocks, as under:—

Wire, Rod, Bar, Rounds, Flats and Hexagons.

Sheets from 10—26 gauge.

Solid Drawn Tube.

Rivets:—Flat and Round Head.

Monel Ingot for Castings; also

Monel Shot for Foundry use.

Magnesium Stick for deoxidation in Monel casting.

Welding Rods—Plain and coated with deoxidising compound.

Pure Nickel can be obtained as under:—

Sheets, 20—24 gauge.

Tubes.

Pellets and Fines for Foundry use.

### Uses—When Made Up

Monel Metal equipment is easily kept clean with soap and water, and is not injured by alkalis or chemical polishing compounds. It is entirely free from the limitations of plated goods; it is solid throughout, and its appearance improves with use.

Monel Metal is easily distinguishable from other non-ferrous nickel-alloy metals of similar appearance—Monel Metal is magnetic.

Utilise the inherent qualities of Monel Metal by specifying it for equipment where resistance to heavy wear and tear and corrosion has to be combined with highly ornamental and attractive appearance, as for Skylight Frames, Fly Screens, Metal Finishings, Roofing and Flashings, Ventilating Equipment, Ornamental Hardware.

For the above and the following, Monel Metal meets these requirements better than any other available metal, and effects substantial economies both in care and maintenance.

### Kitchen Equipment

Monel Metal equipped throughout the kitchen lessens the drudgery of housework because it is so easy to keep clean, so durable, and makes the kitchen look the bright and attractive centre of household efficiency that it should be in every home and establishment.

It may be used for drain boards, laundry chutes, cabinet tops and fittings, range hoods, oven linings, plate warmers, shelf linings, wall protectors, drawer linings and refrigerator finishings.

### Special Applications

In recent years Monel Metal has been found to serve in many unusual plans, and the possibilities of its application are unlimited. The agents will be pleased to co-operate with the architect or engineer in the study of special applications of this metal.



Monel Metal is unsurpassed in kitchen equipment for continuous wear—as instanced in the kitchen of this Australian Railway Dining Car.

### Table Tops

Monel Metal laid on table-tops resists abrasion, preserves the life of the table, ensures cleanliness, brightens the kitchen at the working centre, and harmonises the table with the balance of the Monel Metal kitchen equipment.

### Dish Washers

Monel Metal in and on dish-washers is the outward and visible sign of the inward and actual cleanliness. It is the logical metal for the dish-washing machine, being rustless and free from verdigris. The appearance of such a Monel machine gives the finishing touch to the up-to-date Monel kitchen.

### Linings

Monel Metal is used extensively for oven-linings, shelf-linings, cabinet and cupboard-linings, as, owing to its flexibility, a single sheet may be used as lining and moulded into the unit without seams or joints which are prone to harbour germs and are difficult to clean.

### Engineering Applications

Monel Metal has been successfully used as pump rods, valves, liners, impellers, motor-boat shafting, keel bolts, propellers, tank linings, etc.

### Sinks

Monel Metal Sinks are sanitary, and rustproof, not affected by hot utensils or dishes. Drain boards may be either fluted or smooth. They are strong and consequently not easily damaged by blows from heavy pots and pans.

### Cafeteria Equipment

The primary consideration in fitting a cafeteria must be to provide equipment that will withstand hard wear and rough treatment, and at the same time that will appeal to customers by a clean and attractive appearance. Monel Metal is the obvious solution to this problem. Bain Maries sinks, serving counters, work counters, utensils, trays, food cabinets, drawers, steam tables, plate racks, all give utmost service combined with beauty and healthful cleanliness when made of Monel Metal.

### Steam Tables

Steam tables in restaurant, hotel, and cafeteria kitchens constructed of Monel Metal give maximum service, and make that usually strictly utilitarian fitting somewhat of an ornament. The kitchen staff appreciates the cheering effect of shining Monel Metal surfaces; their sanitary, non-corrosive properties are an appreciable aid to efficiency.



The sanitary qualities of Monel Metal, combined with steel-like strength, are necessary in the construction of this Bain Marie.

(Continued on next page)

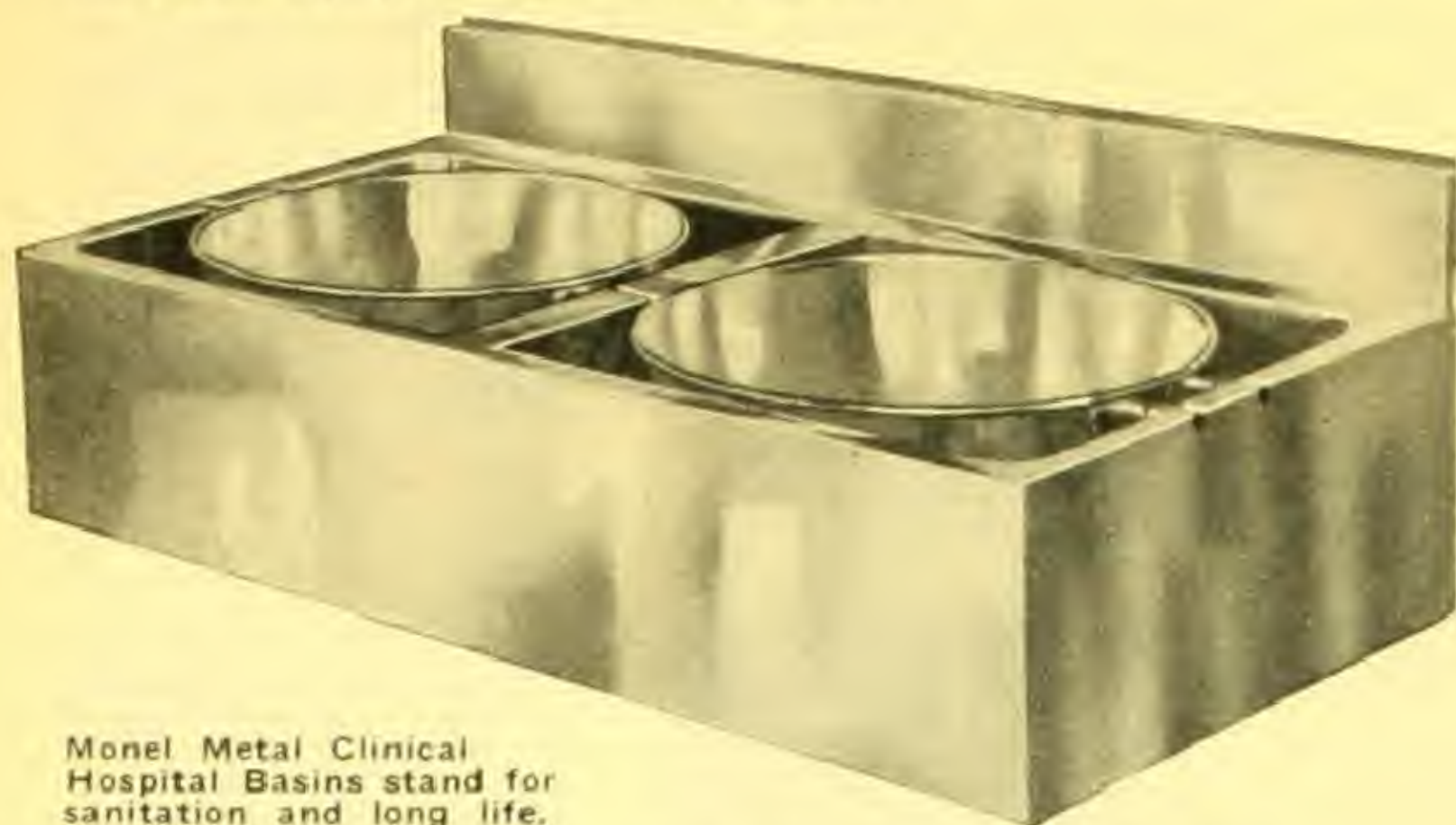


The tough, non-rusting qualities of Monel Metal will withstand the rough wear and tear of a lifetime in this Dish Washer.



### Monel Metal Hospital Equipment

The first Monel Metal installations were made over twenty-three years ago, and, after this long period of time in service under the most severe conditions, are still functioning perfectly with every indication pointing to indefinite life. For this reason, the demand for Monel Metal equipment has been steadily growing. The last figures available show that in 1929 there were 569 Hospitals equipped with Monel Metal.



Monel Metal Clinical Hospital Basins stand for sanitation and long life.

Because no other metal has such an outstanding record, Monel Metal has become recognised as the ideal material, and should be specified for surfaces, finishes and fittings, such as for clinical cabinets, obstetrical beds, dietary cabinets, built-in cabinets, portable cabinets, mortuary refrigerators, laboratory sinks and tables, utensil racks, sterilizers, instrument, operating and bedside tables, etc.

### Basins and Utensils

Monel Metal Hospital utensils last many times as long as any other, and so reduce replacement costs to a fraction. They won't rust, chip or peel, they resist corrosion, and are absolutely sanitary. Specify that all instrument trays, bed pans, dressing basins, sponge bowls, wash basins, solution basins, pitchers, basin racks, stools, etc., are supplied in Monel Metal.

### Sterilizers

Sterilizers, both standard (as illustrated) and built-in to walls, are decidedly improved by the use of Monel Metal in their construction, which is maintained scrupulously clean and lustrous with a minimum of effort, and resists heat far beyond requirements of sterilizers. In hospitals where the sterilizers are built-in, the whole surface of one wall is covered with Monel Metal, and the openings for the various sterilizers, which are themselves lined and equipped with Monel Metal trays, are let into this surface. The standard sterilizers are used more frequently in smaller operating theatres.



Monel metal is used in this Sterilizer because it is a sanitary metal and will withstand the rough wear.

### Monel Metal Fabrication

The fabrication of Monel Metal from the raw material into its various made-up forms is the work of skilled sheet metal workers.

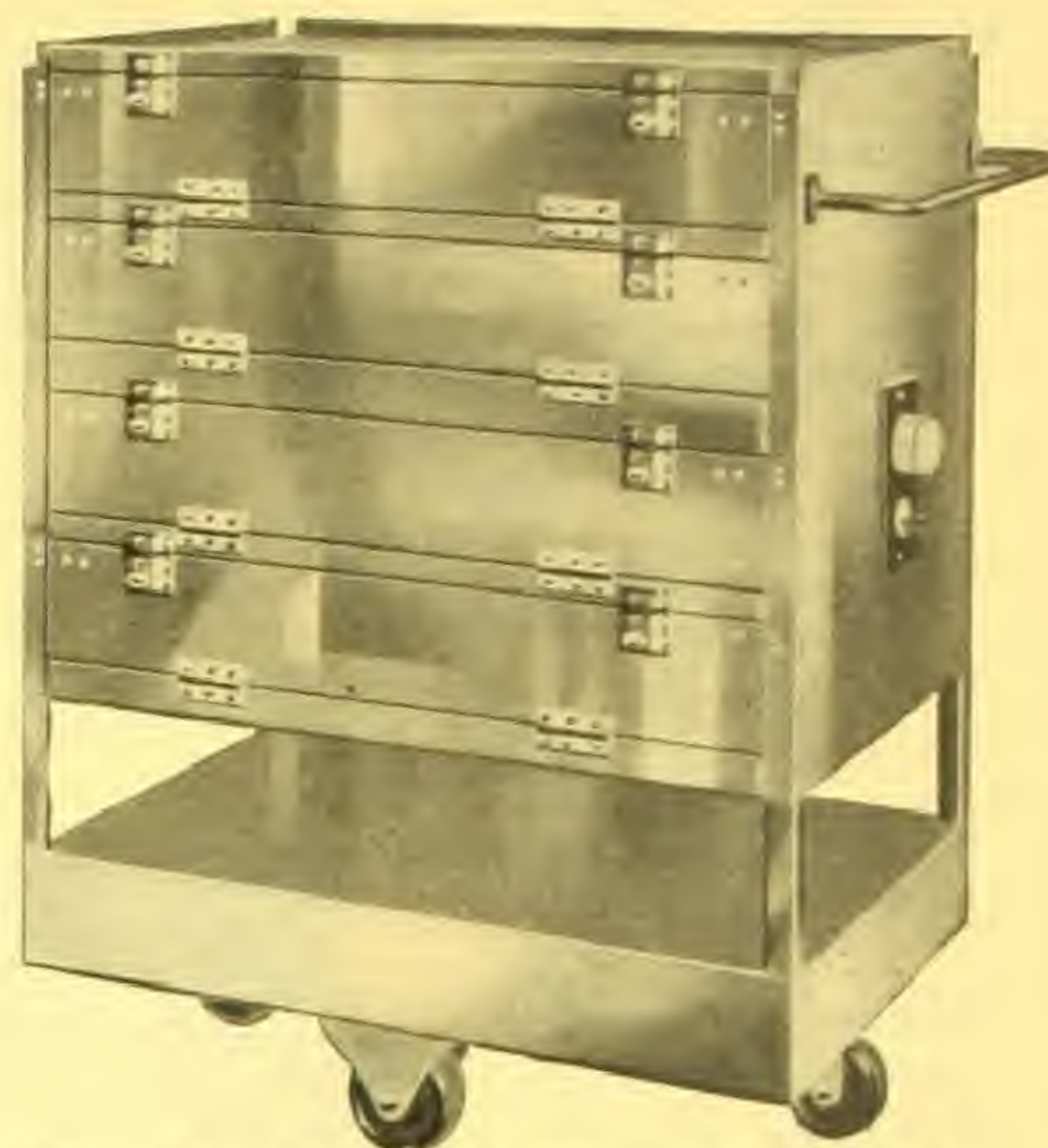
Lists of firms in each State who are especially competent to work in Monel Metal will be forwarded on request to the Agent. See list on first page.

### Laundry Equipment

Monel Metal has given many years of proved service. Whether on the basis of low yearly capital cost, economy in upkeep, or proved suitability for the desired service, the superlative merits of Monel Metal equipment are abundantly justified.

Monel Metal has amply proved it possesses adequate strength, and the ability to resist washing solutions, soaps and bleaches. It possesses a permanently smooth mirror-like surface, which improves with continuous use, and is therefore a safe and reliable metal against delicate fabrics.

The various uses of Monel Metal include washers, extractors, trucks, chutes, starching equipment, ironers, etc.



Electrically heated food conveyor constructed of Monel Metal, which is an approved metal for food service equipment.

### Food Trolleys

The old method of carrying trays of plates from the kitchen, besides the weight being a strain on the nurses, was not absolutely hygienic, and it has now been replaced by the modern food conveyors, which carry the food in bulk from the kitchen so that it may be served fresh and hot at the ward, or in the corridor outside the ward, whence it is wheeled to the patients in a smaller, enclosed, electrically-heated Monel Metal dish truck, as illustrated. This system ensures the food reaching the bedside in the cleanest and most appetising manner, while at the same time it is a valuable time saver to the nursing staff.

### Operating Tables

Operating tables must, of course, always be the last word in sanitation. Users and manufacturers have standardised on Monel Metal for operating room equipment, and its use is now practically universal. Owing to its flexibility, it may be moulded about all intricate corners, joints and sections of the modern operating table, without necessitating the use of joints or seams which are likely to harbour germs or infection. Its shining, silvery surface gives a pleasant impression of beauty combined with hygiene. There is no danger such as is risked with enamel or glass-surfaced operating tables, of tiny particles or chipping from the surface being conveyed to aseptic field of the operation.

### Literature Available

Many of the special applications of Monel Metal and Nickel are described and illustrated in a series of leaflets, as well as in a more comprehensive pamphlet form. If you are interested in any particular application, a copy of available literature will be forwarded on request to the Agent. See list on first page.



It is recorded that a Monel Metal Operating Table constructed 21 years ago is still giving good service.



Architectural  
BRONZE

# WM. BEDFORD LTD.

*Artists in Metal*

(Established 1890)

476-490 LONSDALE STREET, MELBOURNE

SHEFFIELD HOUSE, PITT STREET, SYDNEY

15a

S.A.A. File No.

[For Other Products, See Pages 164, 246, 328, 415]

## ARCHITECTURAL BRONZE



### Products

Fine Architectural and Ornamental Metal Work, executed in Bronze, Brass, Nickel Bronze and other metals. A partial list of products includes the following:—

Architectural and Decorative Castings.

Altars.

Bank Screens and Fittings.

Balustrades.

Bulletin and Directory Cases.

Candelabra.

Display Cases.

Ecclesiastical Wares.

Grilles and Guards.

Lamps.

Letters and Figures.

Mausoleum Doors.

Memorial Tablets.

Plaques.

Pulpits.

Railings.

Seats.

Signs.

Ticket Booths.

Urns and Vases.

Special Hardware.

Caulfield City Hall,

Victoria.

Bronze Lettering on  
Facade (above).

City of Caulfield Bronze  
Memorial Tablets in the  
foyer, showing 11 of the  
32 tablets containing  
1,600 names (at right).

Architects: Messrs.  
Jenkin and Goldsmith,  
Melbourne.



(Continued on next page)





Memorial Tablet, Boys' High School,  
South Yarra, Victoria.

Architect: Chief Architect, Dept. of Public  
Works, Melbourne.



Window Grilles, Science House, Sydney.  
Architects: Messrs. Peddle, Thorpe & Walker.



Bronze Tablet executed for the State Savings Bank,  
Victoria.

Architects: Messrs. Godfrey & Spowers.

### Facilities

After years of organisation and planning, we have provided a consultancy and designing department which has become highly specialised and can be taken as authoritative. Our long experience qualifies us to handle the most difficult and exacting architectural requirements. Our artists and craftsmen are instructed to execute all our work in the most thorough and painstaking manner.



Solid Bronze Grille (Double-faced), Public Library, Melbourne.

Architects: Messrs. Irwin & Stevenson.

(Continued on next page)





Counter Treatment in Bronze, consisting of Grilles, Panels, and Footrills—offices of the Melbourne "Argus."

Architects: Messrs. Godfrey & Spowers.

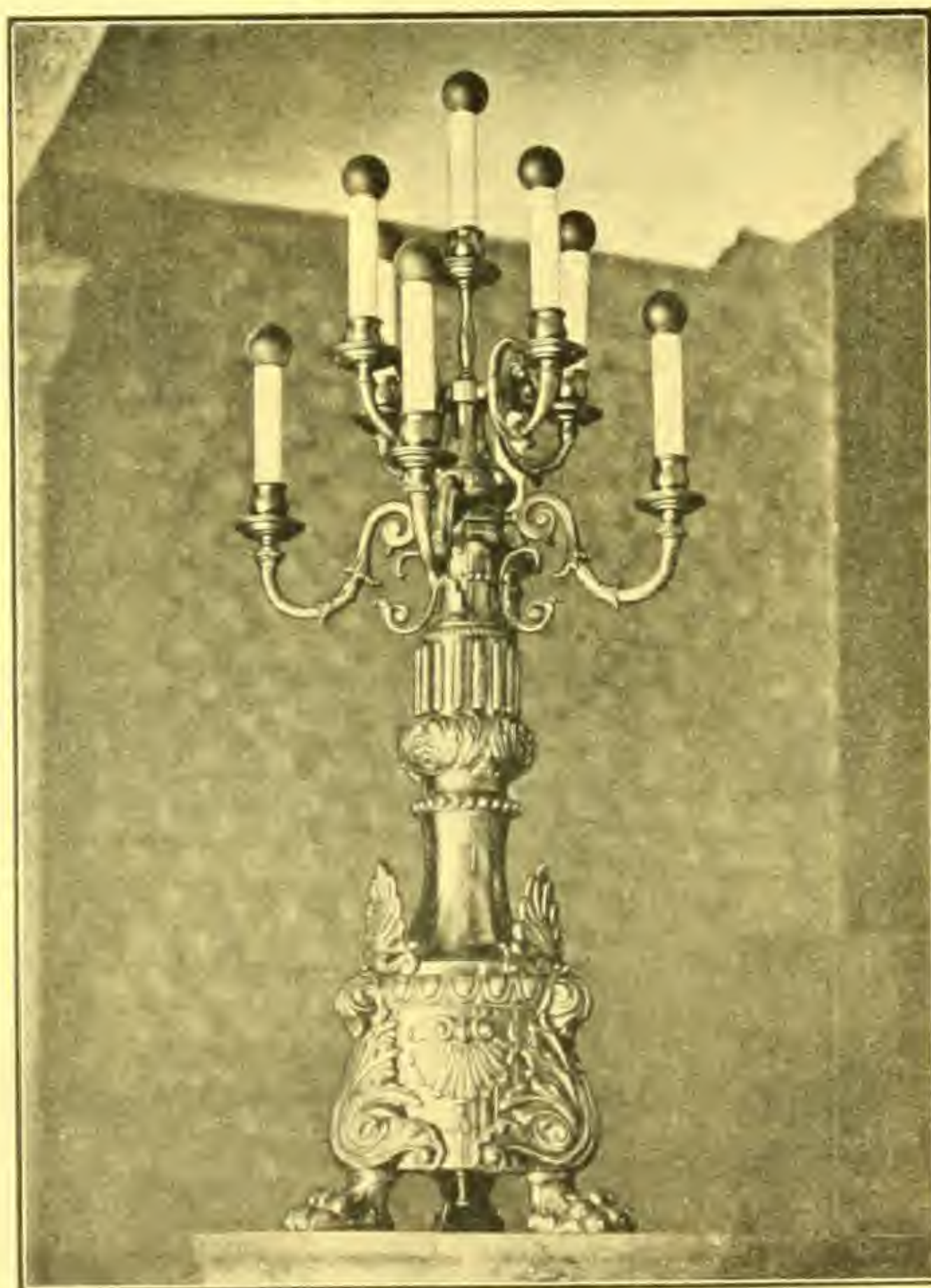
### Ornamental Bronze

For balustrades, bank cages, grilles, mail boxes, railings—in fact, for all ornamental features—solid bronze is the logical metal to use. Nothing else lends itself so well to the artistry of perfect craftsmanship—witness the fact that it was the metal chosen by the fine Italian workmen for those exquisite works of beauty. In bronze, details can be delicately wrought, sharply incised, or crisply undercut. It is strong and permanent. With no other metal is it possible to get the range of colour that is possible in ornamental bronze. It remains beautiful after years of exposure, and need not be painted, for it does not rust.



Italian Renaissance Grille to Ticket Window—Comedy Theatre, Melbourne.

Architect: Chas. N. Hollinshead, Esq.



Stair Newel, Palais Theatre, St. Kilda, Victoria.

Architect: H. E. White, Esq.

(Continued on next page)



## TYPICAL CAST BRONZE ORNAMENTS



B 829a.  
Window Transom Cresting for Display Window.



B 851.  
5½ in. x 5½ in.



B 847.  
4½ in.



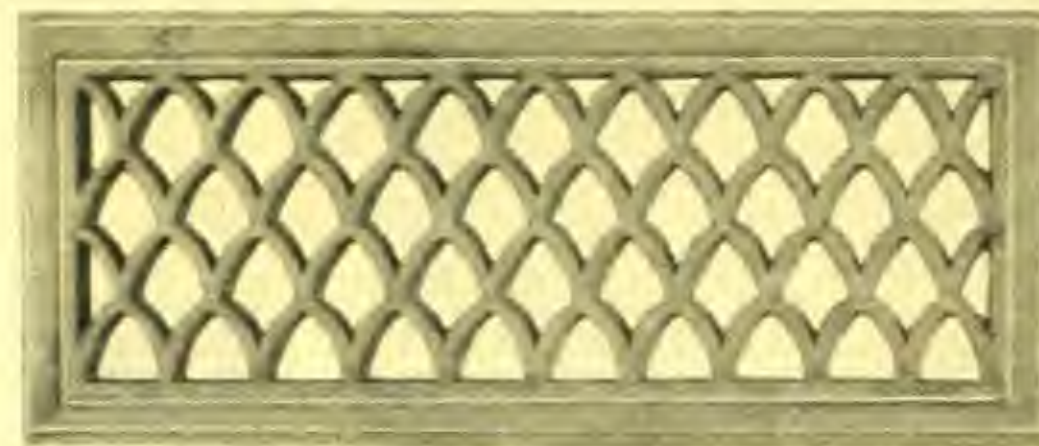
B 845.  
4½ in.



B 826.  
6 in. x 2 in.



Rosettes and Ornaments.  
B 832.  
8 in.



Vents and Grilles.  
B 758.  
14½ x 6 inches.



B 753.  
Any length, by 5 inches.

## Embellishments in Metal Furnishings.



B 843.  
1½ in.



B 807.—1½ inches wide.



B 842.  
1½ in.



B 793.—1½ inches wide.  
Moulding for Metal Doors, Tablets, etc.

R

Cast Bronze Letters  
Manufactured in All  
Sizes from ½ to 24 in.

E

For Representative  
Designs See  
Catalogue.



B-R

**BROOKS, ROBINSON & CO. LTD.**

ELIZABETH STREET, MELBOURNE

WORKS: MAFFRA STREET, SOUTH MELBOURNE

Telephone M 3131 (5 lines)

16a

S.A.A. File No.

[For Other Products, See Pages 70, 95, 172, 235 and 468]

**Products**

Ornamental Metal Windows; Entrance Doors and Bronze Grilles.

**Architectural Bronze Work**

Brooks, Robinson & Co. Ltd. have pioneered the manufacture of Architectural Bronze Work in Australia, most of their work being of a highly specialised character requiring a very high order of workmanship and design. Examples of this work may be seen in most of the important public buildings erected in Australia during the past 15-20 years.

The operations entailed in the production of Architectural Bronze work are: Selection and preparation of material, production of dies for moldings, stiles, cornices, etc., drawing metal through dies over specially-seasoned wood cores, and framing up of the various units. Where cast ornaments and moldings are included, patterns have to be carved. The various locks, bolts, hangers, etc., are then fitted, the exposed surfaces are polished and either lacquered, or, as is most usual and recommended for outside work, an oxidised finish is applied.

A combination of drawn-metal stiles and rails with either cast or extruded moldings is found to be the most satisfactory method of construction and has been used in some of our more recent contracts.

**Grilles**

The use of bronze grilles in front of plateglass panels in doors and windows is very popular where a light appearance, accompanied by a maximum of protection, is required.

These grilles are of solid cast bronze, with turned, twisted or plain bars. For the purposes of cleaning, either the grille may be hinged, or, as is usually adopted, the frame holding the glass panel is hinged.

Brooks, Robinson & Co. Ltd. are equipped to design, manufacture and instal bronze grille work, and are specialists in this work as applied to banking and similar applications.

**Metal Trim**

As manufactured by Brooks, Robinson & Co. Ltd., metal trim becomes of definite ornamental value. Corners are sharp and molds are true to form. Metals used are bronze, brass or steel, and a large variety of finishes are available.

**SOME RECENT CONTRACTS.**

State Government Savings Bank of N.S.W.

Architects: Messrs. Ross &amp; Rowe.

A.M.P. Building, Melbourne.

Architects: Messrs. Bates, Smart &amp; McCutcheon.

Bank of Australasia, Melbourne.

Architects: Messrs. A. &amp; K. Henderson.

Bank of N.S.W., Brisbane.

Architect: Francis R. Hall.

Government Savings Bank, Sydney.  
Entrance Doors—Bronze.Electricity Commission, Melbourne.  
Bronze Doors.



# AUSTRALIAN METAL PRODUCTS PTY. LTD.

GENERAL OFFICE AND PLANT:

REAR NICHOLSON & SCOTCHMER STREETS  
FITZROY, VICTORIA

Interstate Distributors:

S.A.A. File No.

SYDNEY—H. E. McClelland, 55 York Street  
BRISBANE—Messrs. Bernays & Anderson,  
125 Adelaide Street.

ADELAIDE—Messrs. George Wills & Co. Ltd.,  
31 Grenfell Street.  
PERTH—Messrs. George Wills & Co. Ltd.,  
156 St. George's Terrace.

STANDWELL

[For Other Products, See Page 260]

## Products

Hollow-Metal and Metal-Covered Doors, Swing or Sliding, and Hollow-Metal Lift Doors; Combination Steel Jambs and Architraves; Metal Lockers and Shelves; Metal Skirting.

## Approved Fireproof Construction

"Standwell" Fire Doors have been approved by the Fire Underwriters' Association of Australia and the building authorities of the respective capital cities of Australia for vertical shafts such as staircase wells and lift wells.

## Construction

### Door

"Standwell" Doors are constructed of 5in. wide stiles and top rail and 10in. bottom rail. Stiles and rails consist of a wood core of non-resinous, well-seasoned timber encased with a drawn metal covering of galvanized steel sheets (rust resisting), flanged in such a way as to meet together on the inside of all stiles and rails. The junction of the wood cores at the stiles and rails are grooved both sides, into which the metal covering is ingeniously entered to form interlocking joints. These joints are lead-filled and cleaned off smooth by a finishing process.

Each panel consists of two sheets of galvanized steel with asbestos sheet core between and formed in such a way as to come flat together at flanges of stile and rail. The whole is spot welded together at intervals, thus hermetically sealing the wood core in the metal casing.

The panel mould, being of an attractive design, gives a finish to a distinctive door.

### Frame

Each door is hung in a pressed steel combination jamb and architrave of 16 gauge metal. These frames can be designed to suit any condition of opening. A feature of the single-door installation is that the two-point contact and self-closing equipment is embodied in the frame, thus eliminating fittings on the face of the door.

## Acceptable Design

"Standwell" doors, by virtue of their modern design, have overcome the difficulty, so often presented to the Architect, of disguising the old type of unsightly tin-clad door.

Without detracting from its fire-resisting construction, this door is highly pleasing in design—being a panelled door of 1½in. thickness, hung in a metal frame—the whole being free from ridging or overlapping sheets presents a smooth surface which readily takes any form of finish, thus presenting a door of outstanding appearance and utility.

## Erection

Erection is simplified. Door and frame, designed as a unit, is made and hung in the workshop. Building in of the frame as the work proceeds is desirable; it not only makes for a solid and better fixed job, but a saving of time in building construction. Any damaging of walls or plaster after erection is avoided.



Standwell Doors in the Commercial Banking Co. of Sydney.

## Swing Door

Each swing door is hung in the frame with a pair of 4 inch half-surface ball-bearing hinges fixed to jamb, with metal stove screws on one half and the other bolted through door. The ease of operation of the doors on these hinges is a feature of the installation.

## Sliding Door

Sliding doors are top hung to ball-bearing roller pendants running on a special section drawn-metal track. A feature of the sliding door is the interlocking joint between door and frame at head and back of door which operates when door is closed.

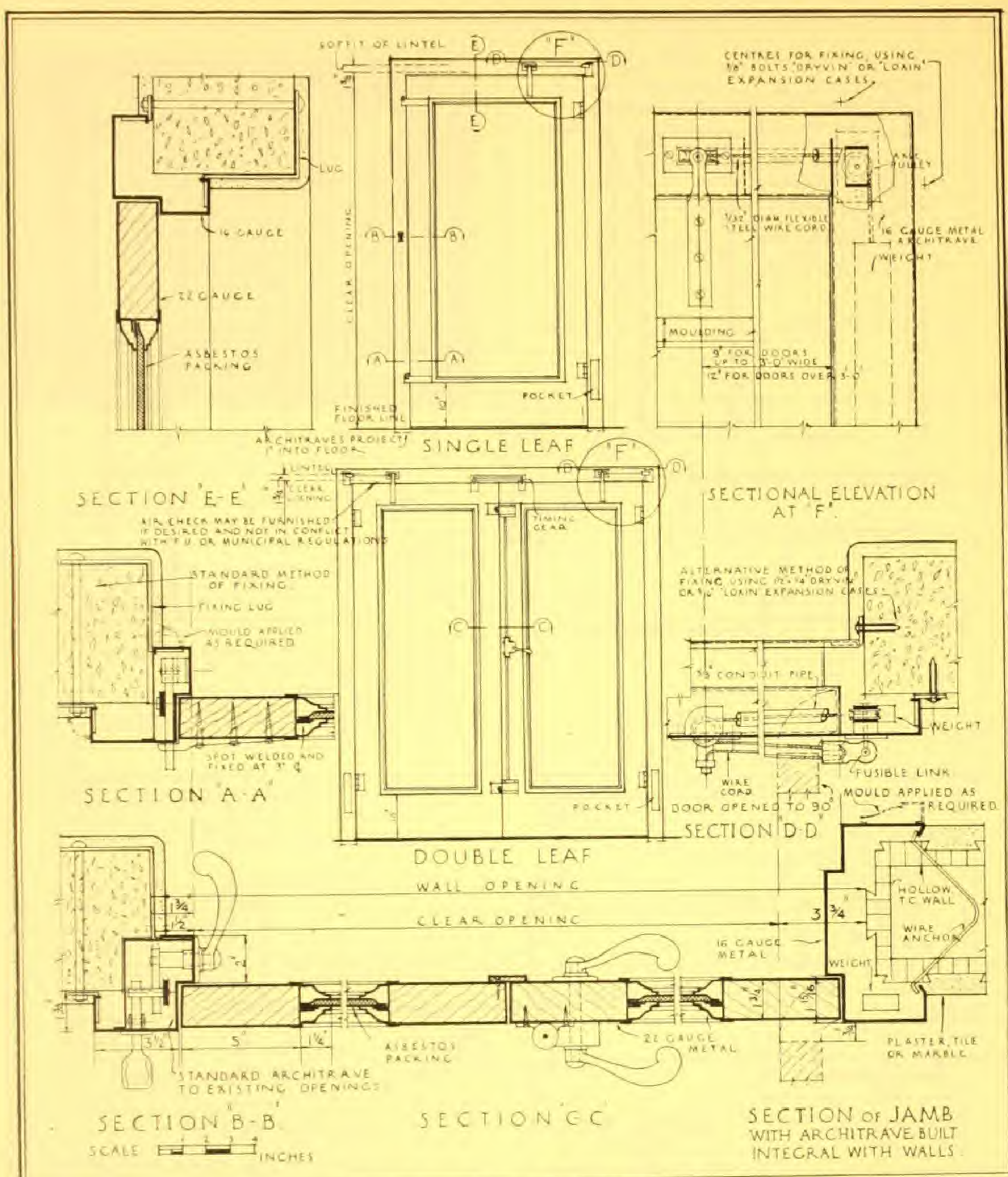
All doors close smoothly and sweetly. No metallic banging. Simplicity of operation.

## Finish

Any kind of finish can be obtained, such as lacquer or grained enamel to colours as desired. The quality of metal used lends itself to the highest degree of finish possible.

(Continued on next page.)





STANDWELL  
FIRE  
DOORS

# DETAILS OF AUTOMATIC CLOSING AND LOCKING EQUIPMENT TO "STANDWELL" SINGLE AND DOUBLE LEAF HINGED DOORS.

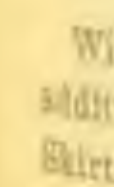
DRAWING  
No 2  
12<sup>TH</sup> SEPT  
1930.

(Drawn by the Architectural Staff of Ramsay's Catalogue)

(Continued on next page)

RAMSAY'S CATALOGUE









Standwell Sliding Doors in the T. &amp; G. Building, Sydney.

## ARCHITECT'S SPECIFICATION

## GENERAL

All Fire Doors where indicated on plan (or as per Schedule below ..... or ..... describe location) shall be "Standwell" swinging and/or sliding doors hung in pressed steel jambs and built in as the work proceeds, the whole construction being in accordance with the F.U. Association standards.

## DOOR CONSTRUCTION

Door stiles and rails shall be 1½ in. thick, constructed of a wood core of non-resinous well-seasoned and truly milled timber, metal covered with 22 gauge galvanized steel, rust-resisting sheets, spot welded to panels consisting of galvanized sheets with asbestos core. Form interlocking joints at junction of stile and rails, all lead-filled. Panels shall be finished all around with metal mould of standard design.

## FRAMES

Frames shall be of one piece, combination plain (or moulded) jamb and architrave, embodying all self-closing and locking equipment. Each swing door shall be hung with a pair of 4-inch half-surface, ball-bearing hinges.

Each sliding door shall be top hung to ball-bearing roller pendants running on a special section track.

## FINISH

Frames and doors shall be delivered on the job shop-painted in one good coat of priming to take lacquer or paint finishes as specified later.

## BUILDING IN

Frames shall be solidly built in as the work proceeds by the General Contractor, who shall take all responsibility for the true setting of the frames in the wall.

## STANDWELL DOOR INSTALLATIONS

Commercial Banking Co. of Sydney, Melbourne.

Architects: Bates, Smart and McCutcheon.

Bank of Australasia, Melbourne.

Architects: A. & K. Henderson.

A.M.P. Building, Melbourne.

Architects: Bates, Smart and McCutcheon.

Julius Kayser Building, Richmond, Victoria.

Architect: J. Plottell.

Richmond Terminal Station, Victoria.

Architects: State Electricity Commission.

Dominion House, Melbourne.

Architects: Hare, Alder, Peck and Lacy.

Equity Trustees Building, Melbourne.

Architects: Oakley & Parkes.

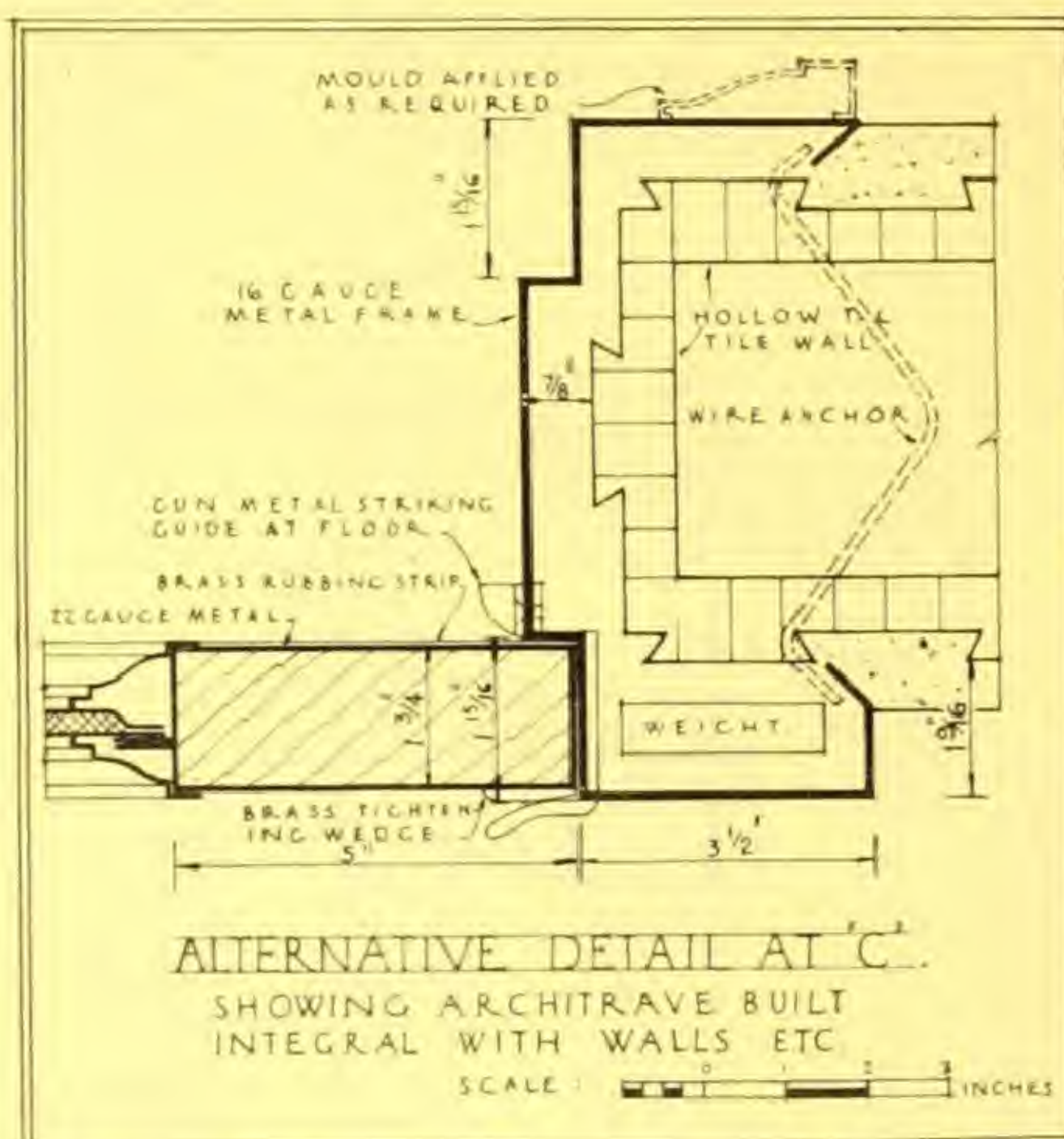
G. J. Coles, Melbourne.

Architect: H. A. Norris.

State Electricity Commission Building, Flinders Lane.

T. & G. Building, Sydney.

Architects: A. & K. Henderson.

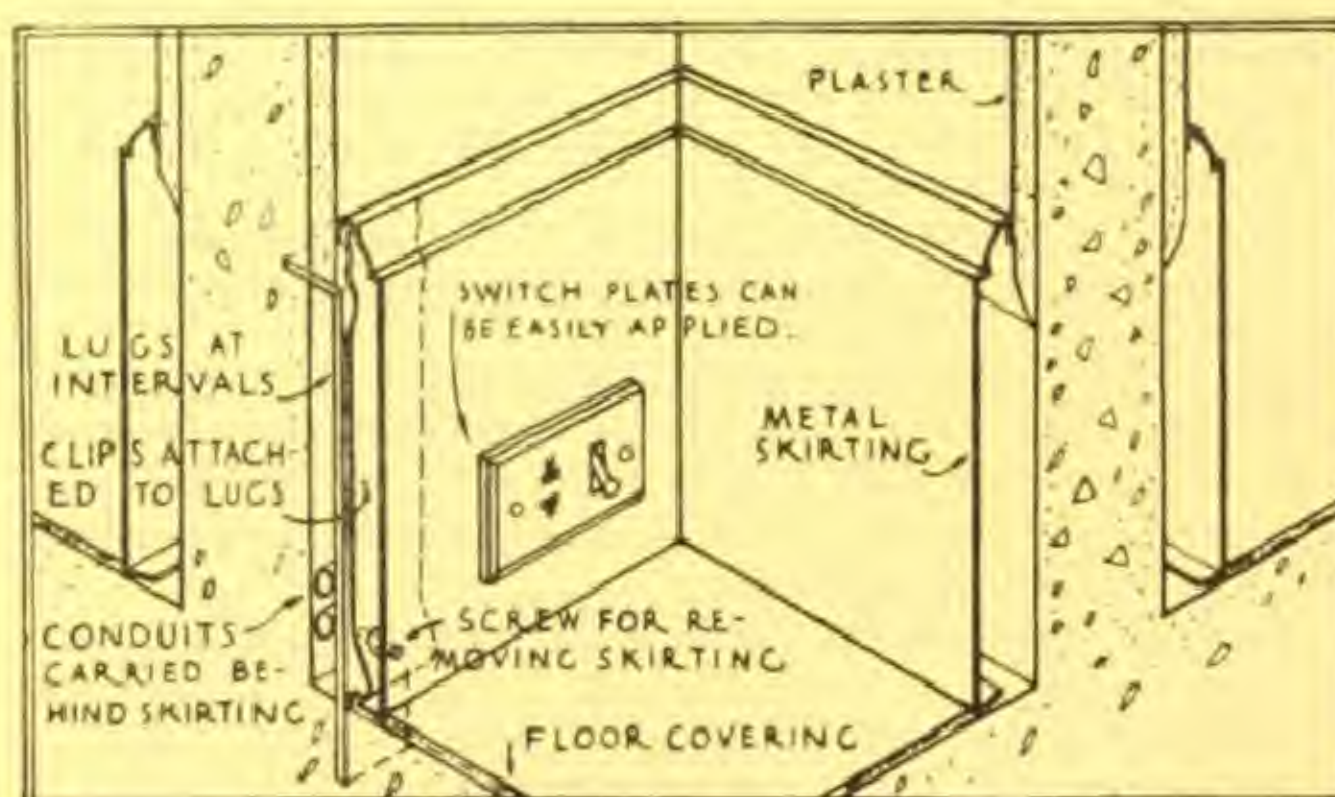


## METAL SKIRTING

Metal skirting, in conjunction with metal jambs and architraves, gives a continuous metal installation irrespective of whether wooden or metal doors are used, in effect that metal to metal contacts are made.

The method of fixing metal skirting is by means of spring clips fixed to brackets at intervals (see illustration). Behind these brackets accommodation is provided for electrical conduits, etc.—the method of clipping makes them easily accessible.

With a lacquer finish, rich effects can be obtained, in addition to giving the material an impervious surface. Skirtings can be made to any size or shape.



(Drawn by the Architectural Staff of Ramsay's Catalogue)

(Continued on next page)



## HOLLOW STEEL COMBINATION JAMB AND ARCHITRAVE

## Description

The combination of door jambs and architraves fabricated in hollow steel sections, provide a building unit acceptable to architects who seek a fire-proof material yet withal architecturally correct in design.

The unit submitted by us is strongly constructed with all mitres welded, thus overcoming the difficulties of sagging and shrinking so often found in wood constructions.

## Construction

The construction of the unit is as follows:—

1. The side jambs are coped to the heads with mortise and tenon attachments, thus insuring proper alignment and accurate dimensions.
2. The casing sections are accurately mitred and acetylene welded on the reverse side, producing neat, concealed and permanent joints.
3. The jambs are mortised, reinforced drilled and tapped for hardware at the factory, giving machine accuracy and eliminating costly field labour.

4. No. 16 gauge, cold-rolled with the rolling process, produces clear-cut, sharp profiles, true and accurate to detail. Wire anchors make the frames a component part of the wall structure.

## Additional Advantages

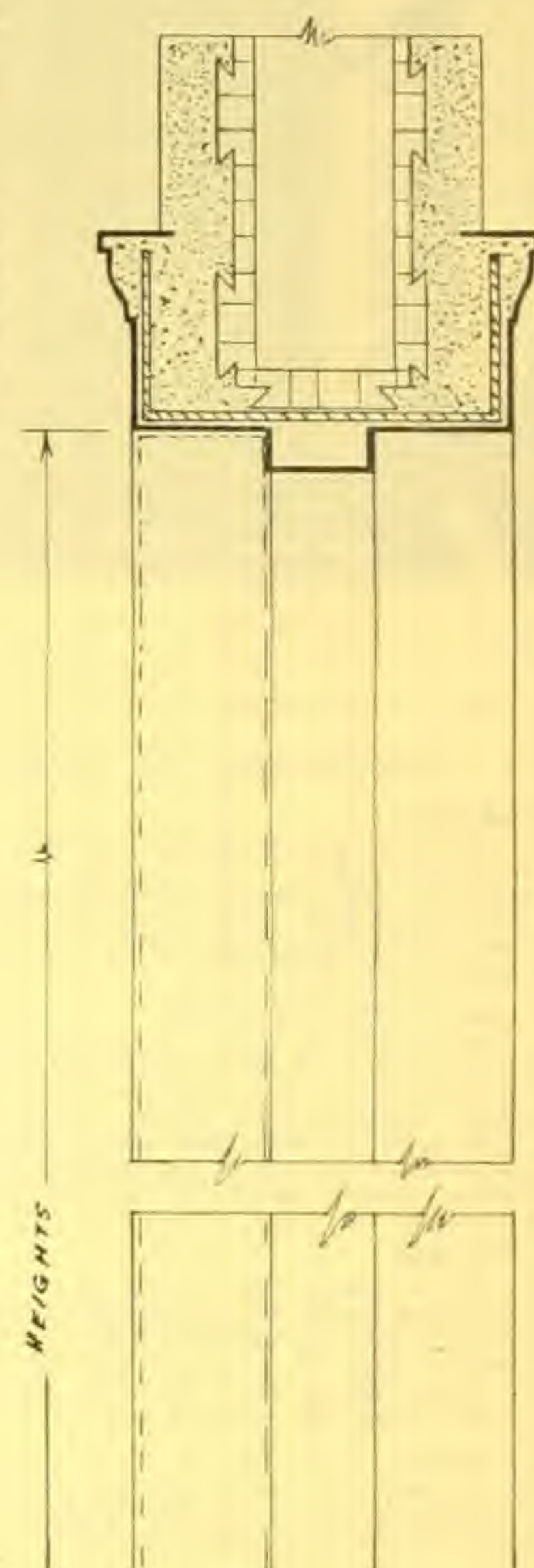
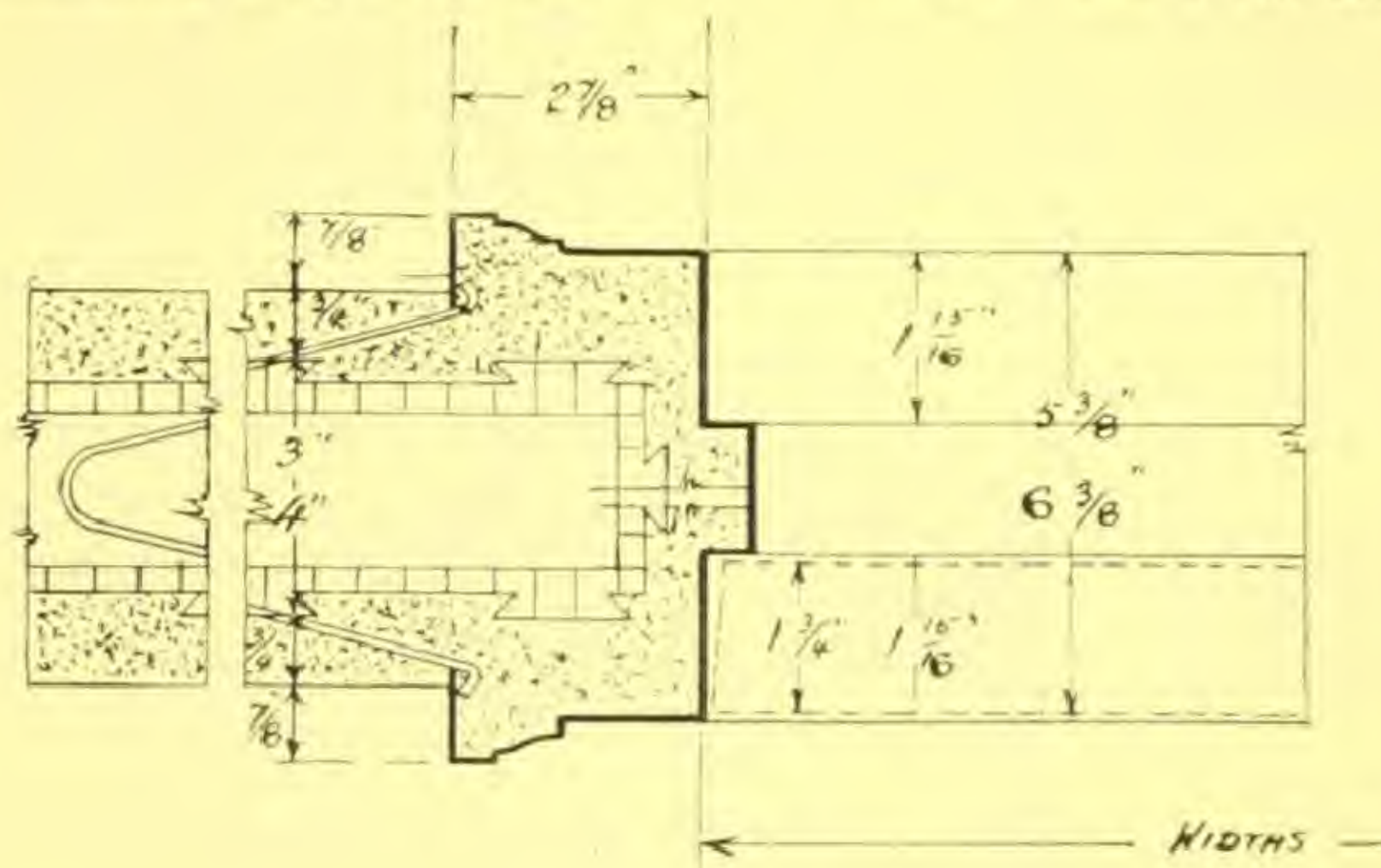
The unit, when built in with the walls, displaces lintels—a saving in itself. Actual tests have shown that 16 gauge rolled-steel section will sustain all terra cotta wall loads without deflection for openings up to 5 ft. wide. Wider openings are reinforced in head with 14 gauge channels as shown, having  $2\frac{1}{2}$  in. flanges. These are good for openings up to 8 ft. wide.

## Stock Sizes

For 3-in. and 4-in. Partition Walls.

Jamb Openings—

6ft. 6in.	high x 2ft. 6in.	wide
6ft. 8in.	high x 2ft. 8in.	wide
6ft. 10in.	high x 2ft. 10in.	wide
7ft. 0in.	high x 3ft. 10in.	wide



## METAL LOCKERS

The low initial cost of metal lockers combined with their ability to stand up to rough usage make them a most economical proposition.

Our metal lockers are made of 20-gauge steel sheets, with doors of 16-gauge; this ensures a strong and rigid construction. Doors can be made with overlapping edge at slight extra cost; this obviates the open joint and is a distinct advantage.

Standard ventilation to lockers is by louvres pressed in the door face, but perforated doors can be supplied to various designs if required.

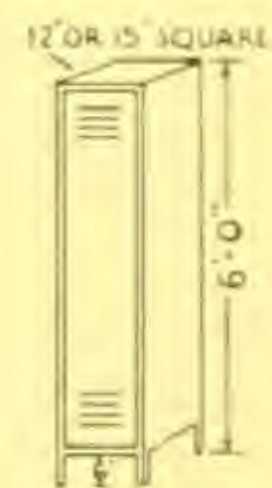
Single type lockers are equipped with hat shelf and three coat hooks. The method of locking is by a three-point espagnolette bolt fitting and lock (master-keyed).

Double type lockers are the same as single type, but with the hat shelf omitted.

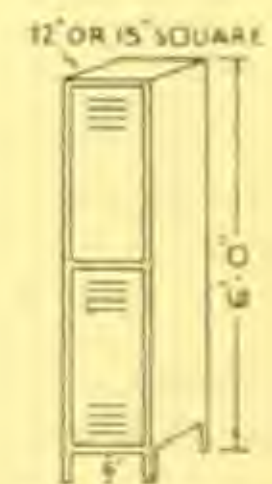
Standard finish is in Olive Green Enamel, baked on.

## Standard Sizes—

Single Type—	6ft. x 12in. x 12in.
	6ft. x 15in. x 15in.
Double Type—	6ft. x 12in. x 12in.
	6ft. x 15in. x 15in.



Single Type.



Double Type.



Type of Metal Lockers Installed in the  
New A.M.P. Building, Melbourne.



## T. S. GILL &amp; SON PTY. LTD.

672-684 CHAPEL STREET, SOUTH YARRA  
MELBOURNE

33g

16b

S.A.A. File No.

ESTABLISHED 1892

GILL

PHONE: WINDSOR 8000

S.A.A. File No.

[For Other Products, See Pages 174 and 238]

## Products

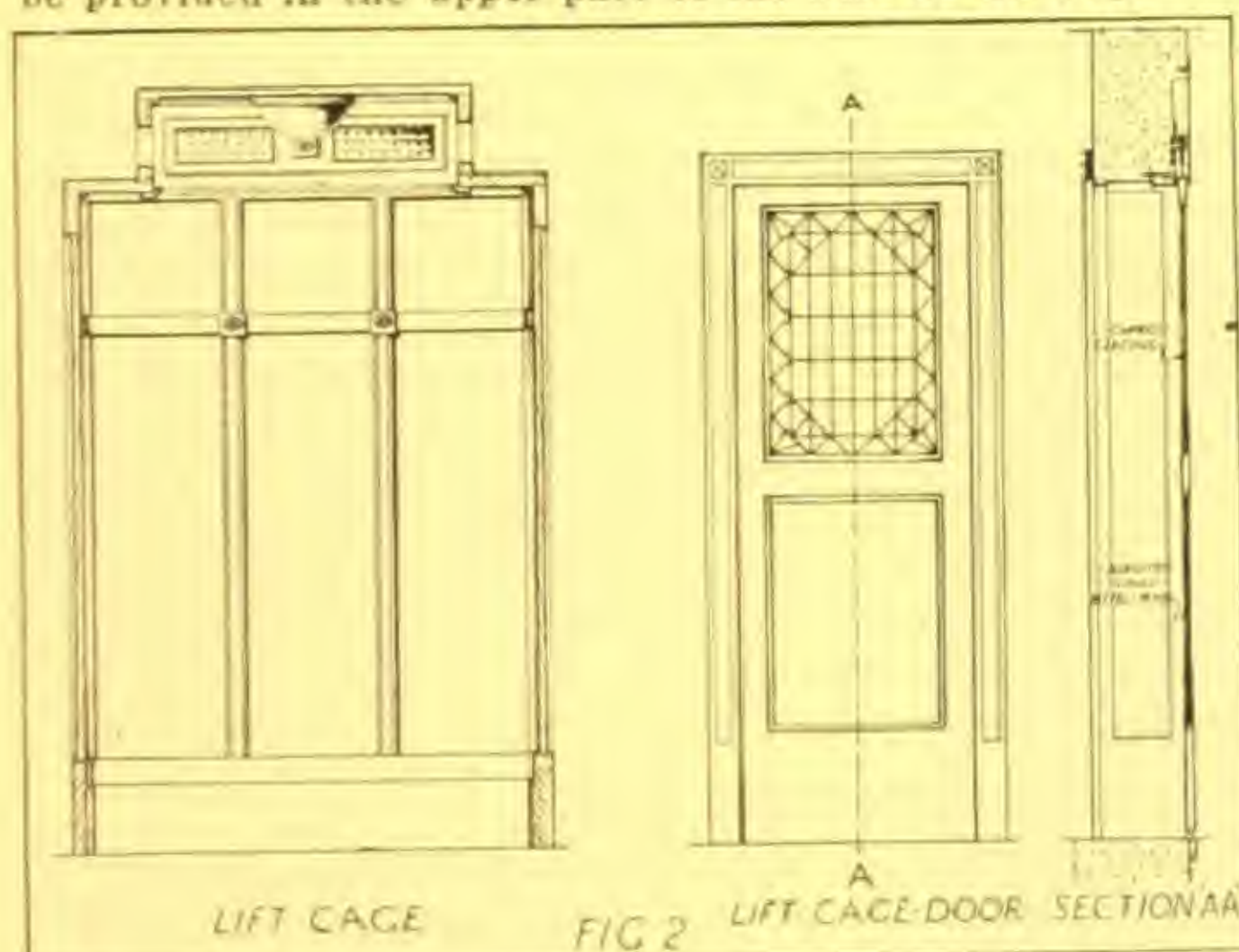
Metal-faced Doors, Lift Cages and Doors, Electric Signs, Stallboard and Pavement Lights, Metal Drawn Moulding in White Copper, Brass or Bronze metal in stock patterns or to Architects' details.

## LIFT CAGES

This class of work is, as far as design is concerned, purely a matter for the Architect, as also is the materials of which the cage is to be constructed, either metal or wood.

## Method of Construction

Whether the interior of a lift cage is finished in either wood or metal, the carcass work will be the same, and should be constructed of ex 2 in. yellow pine, all joints being mortised, tenoned and housed. A suitable size for the framing of a lift cage is ex 5 in. x 2 in. pine. If it is desired to finish the inside in metal, our Fig. No. 2 is typical of a metal interior, but is, of course, open to innumerable variations. Panels are better if not more than 12 in. wide. These should be made of 16 or 18 gauge metal, whilst a 20-gauge metal may be regarded as heavy enough for facing the stiles and rails. Mouldings, if any, may be to detail. They may be either cast metal or metal sheathed stock mouldings, all of which should be screwed from the back and all mitres should be sweated. A ventilating frieze of pierced metal should be provided in the upper part of the roof of the cage.



## PAVEMENT LIGHTS

Little detail or explanation is necessary for this work. The prisms or discs vary in size and thickness, and are set into frames of either cast iron or reinforced concrete. The prisms are double and treble tongued to make watertight.

When the necessary sizes are obtained and a concrete frame is specified, a mould is made, the spacings being such as will suit the prism to be used. The mould will be about 3 in. deep and will be reinforced with  $\frac{1}{2}$ -in. steel bars, wired at all intersections, concrete to be composed of 1 part fine screens to 1 part washed sand and 1 part cement. All discs or prisms are then grouted in with liquid grouting, mixed 1 part of sand to 1 of cement. When desired, the concrete may be kept  $\frac{1}{2}$  in. below the surface of the prism and levelled up with terrazzo or other materials that may be desired by the Architect.

## Sound Construction

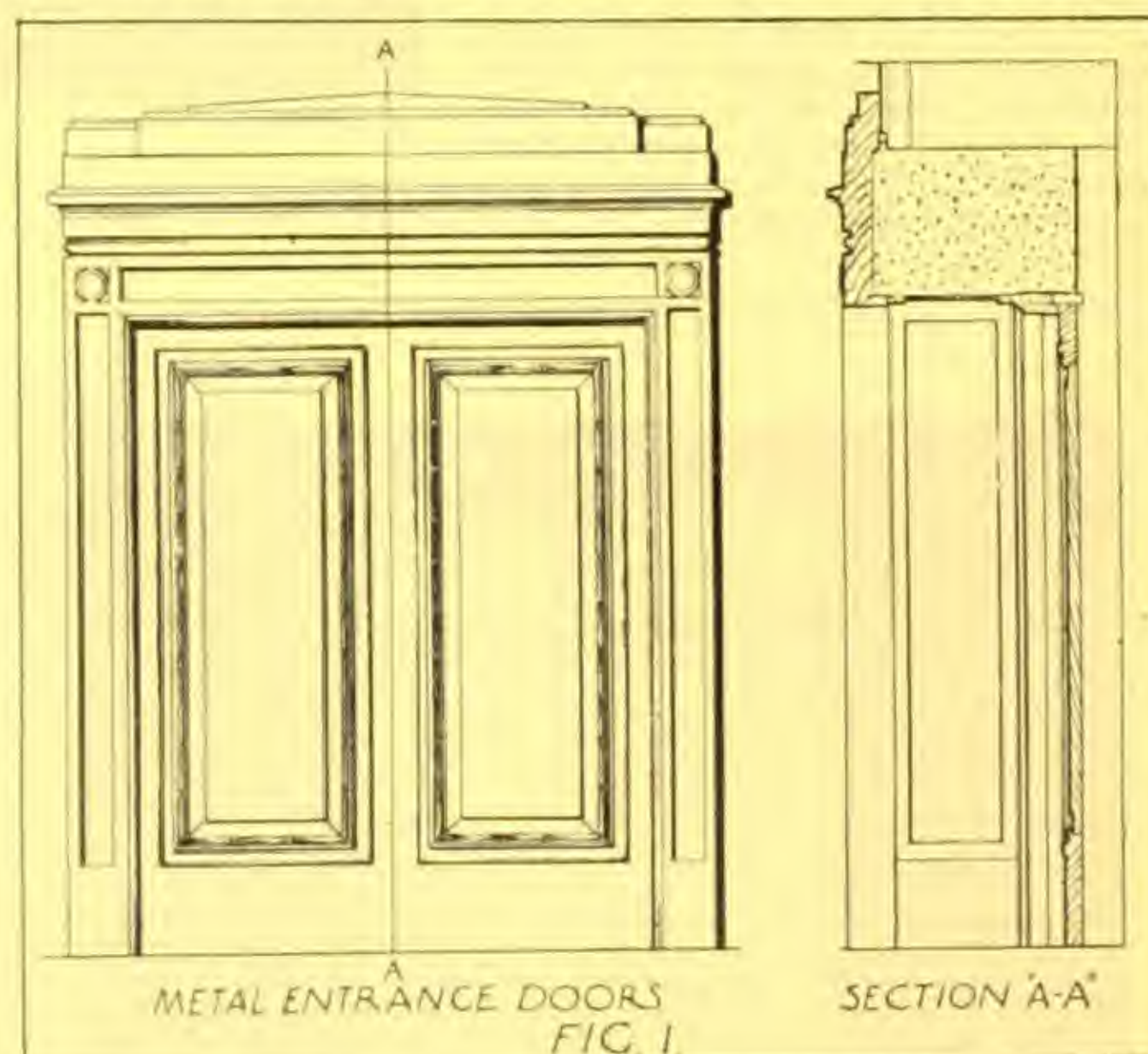
In the manufacture and construction of metal-faced doors, lift cages and doors, T. S. Gill & Son Pty. Ltd. employ methods of construction which have been developed with years of experience. These methods are briefly put forth on this page as a high standard of the requirements necessary in this work.

## METAL-FACED DOORS

These are largely in use for better-class entrances—Banks, Offices and high-grade Stores—and also for lift doors.

## Method of Construction

Stiles should be ex 5 x 2 yellow pine, rails to Architects' detail, but the rails should be  $\frac{1}{2}$  in. less in thickness than the stiles, as a "flush" joint is not desirable. All sheeting should be not less than 20-gauge metal. The stiles should be "stump" mortised and all tenons should be secret wedged. The panels may be either metal or glass. Where glass is to be used, "CUPROS" is the most suitable, and when used as lift doors, the glazing must be of the fire-resisting variety, with a section of the glass left clear for observation purposes.



## ELECTRIC VERANDAH SIGNS

The municipal authorities have now approved of this type of verandah sign, but confine its use to cantilever verandahs.

## Method of Construction

The entire frame work consists of angle iron, braized at all joints, with iron arms to suspend sign from the verandah ceiling. The glazing is in plate glass, secured with metal (iron) beads. The wording or decoration of the glass is preferably done with the sand blast and finished in colour selected. A minimum of ten (10) 200-C.P. lights are necessary for a sign 8 ft. long.



# WORMALD BROS. LIMITED

FIRE PROTECTION ENGINEERS  
SINCE 1889

CITY OFFICE: 19 BLIGH ST., SYDNEY. FACTORY: YOUNG ST., WATERLOO, SYDNEY

## BRANCHES:

MELBOURNE—180 Bay St., Port Melbourne. BRISBANE—"City Buildings," Edwards St.  
NEW ZEALAND—"T. & G." Buildings, Wellington. ADELAIDE—Bowden.  
PERTH—Wellington St.



16c

S.A.A. File No.

[For Other Products. See Pages 158, 244, 264 and 308]

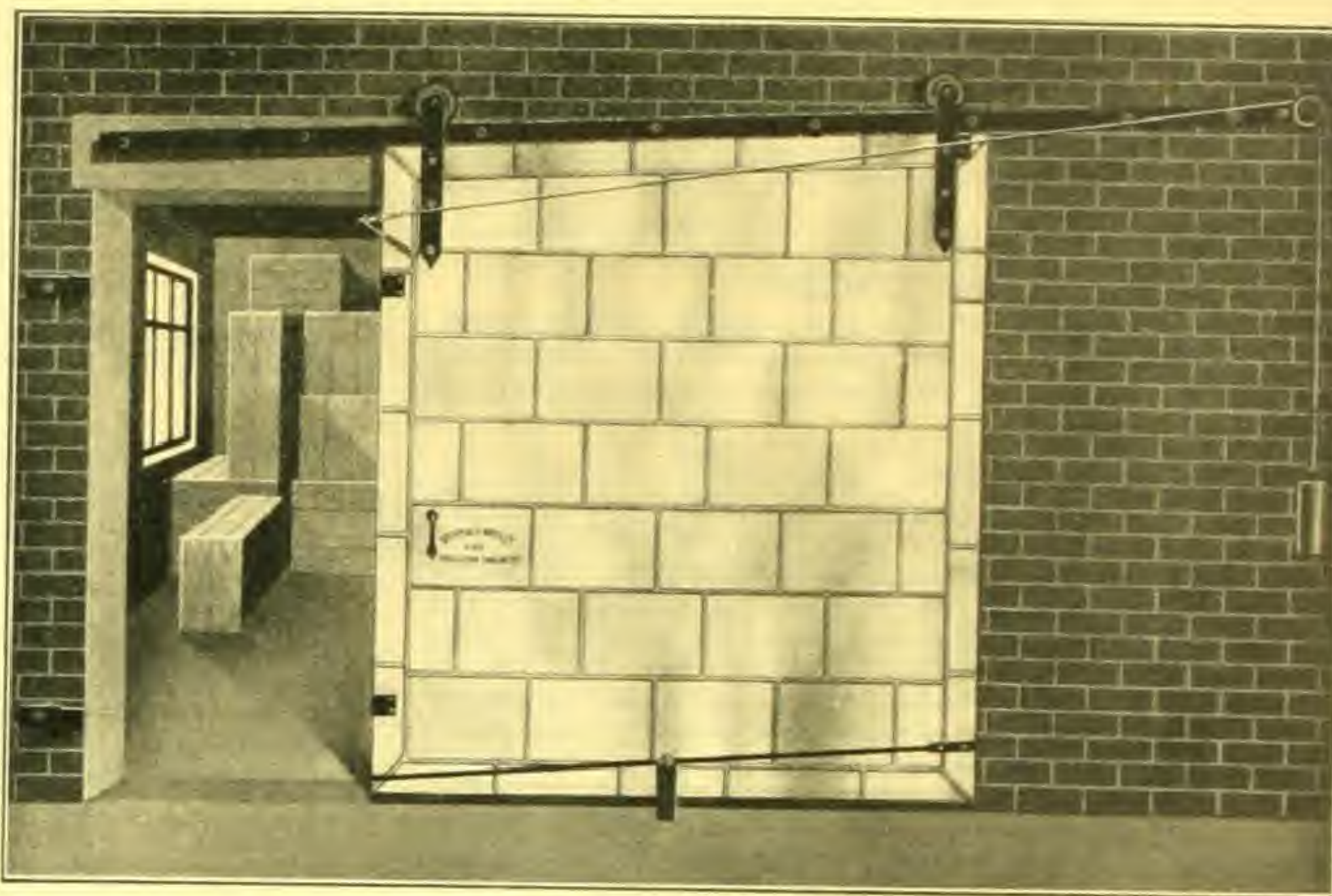
## "WATERLOO" FIRE RESISTING DOORS

### Armoured Doors

The object of a Fire Door is to automatically close an opening in the event of fire, and so block the progress of the flames. Not only the actual flames, but the heat of fire must also be contended with. When subjected to intense heat, solid metal doors become warped and twisted and very quickly become red hot. This heat naturally is conducted through to the other side, and so ignites any combustible materials within range of its influence. To overcome this, Armoured (or Ironclad) Fire Doors have been evolved, and they have proved on many occasions since that they are absolutely safe and dependable.

### Advantages

Because of their construction, Armoured Fire Doors will never warp or twist under heat, and they do not conduct much heat through to the other side. A test made with a fire temperature of 1,960 deg. F. only conducted 90 deg. to the far side. This would not ignite materials nearby, and so is far safer than any other form of door.



Standard Automatic Sliding Fire Door.

### Construction

"Waterloo" Fire Doors are constructed of three or four layers of seasoned Baltic pine, or other non-resinous wood, tongued and grooved, with the layers running in alternate ways. The number of layers is determined by the area of the door. The boards are fastened together with special drive screws till the whole core is one solid piece. This core is then covered with special charcoal-tinned steel sheets in such a manner that all air is excluded. The sheets are actually free to expand, but they cannot become detached. Each of the covering sheets is specially lapped so that they all join one another to form the airtight cover.

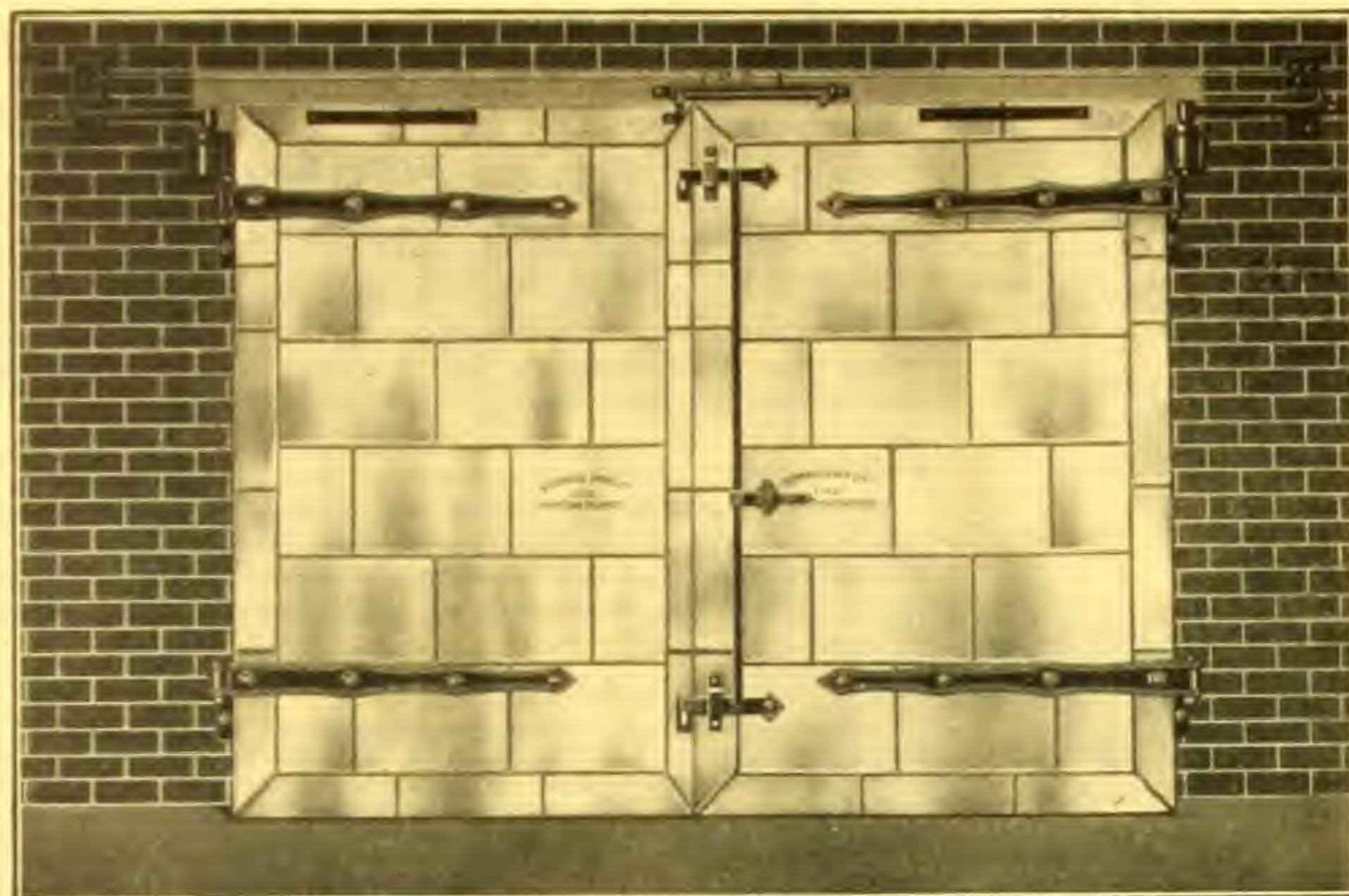
### Automatic Operating Device

To fully comply with the requirements outlined in a later paragraph, all fire doors must have an attachment which causes them to shut into position at the approach of fire. This is achieved by a system of pulleys and weights which are held back by a special fusible link. This is constructed of two sections of brass, fastened together by a special solder which fuses at approximately 155 deg. Fahr. Another system (sometimes used on hinged doors) is with a patented spring arm attachment. This is held back with the same type of fusible link and, when released, it slams the door shut.



Automatic Hinged Fire Door.



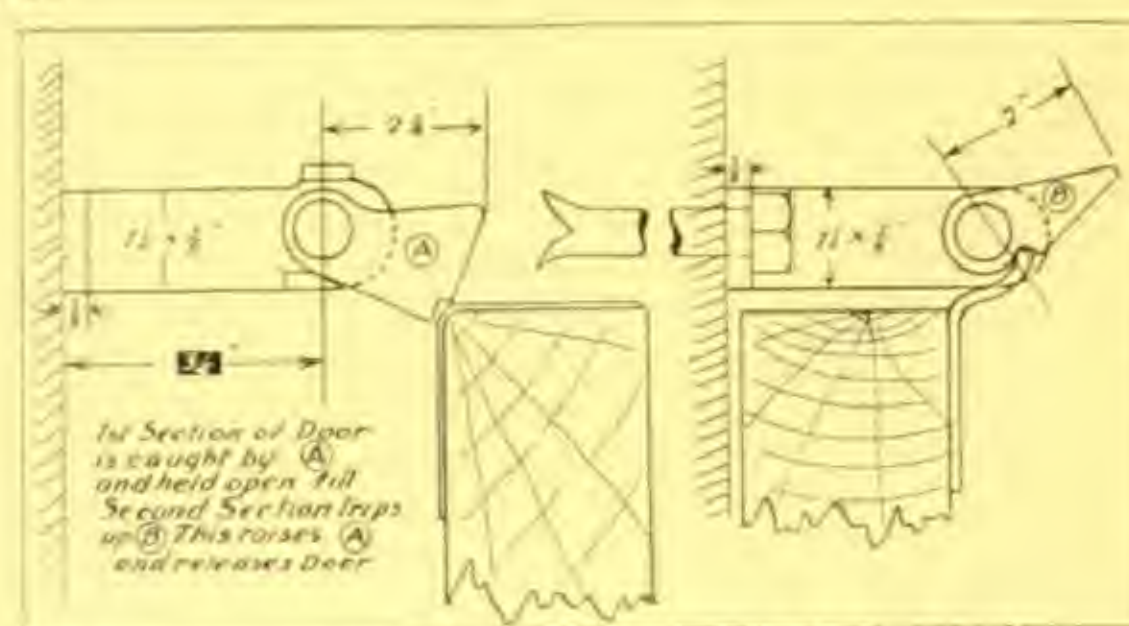


Automatic Double-Hinged Fire Doors, with Patent Closing Device.

**Patent Double-door Closing Device**

When room does not permit the use of a large hinged door, and piers prevent it from sliding, the only alternative is to hinge it in two halves. Doors made in this way are rebated so that they will close together and form a solid break.

It is naturally vitally important that the correct door should close first. We have invented and patented a special lever attachment which, in the event of the wrong half shutting first, holds it open at A in sketch below. The second half then closes and releases the stop by lifting the cam B. The first section then closes into place.



Closing Device for Double Doors.

**Fire Underwriter's Requirements**

To comply with the requirements for making a perfect "cut-off" for insurance rating purposes, doors must be fitted each side of the opening. The walls must be of fire-resisting construction and must be finished off square, so that the door has three inches cover on either side when closed. No opening should be made more than 45 square feet in area without obtaining special permission.

**Floor Details and Methods of Hanging**

If a floor is not of fire-resisting construction, the step must be so built up that there is four inches of fireproof material projecting on either side. In the case of brick piers and wooden floors, it is sufficient to insert an iron checker-plate into the brickwork on each side with the necessary four inches of cover.

The doors are hung by rag bolts built into the walls with cement and are erected by us as a rule (not by the contractor) after the walls have been built.

**Fittings**

Care must be taken in using fittings which will withstand the heat of the fire, and also the possibility of sudden cooling by water. Careful experiments have been made and disclosed the fact that malleable iron is the surest and best material, and this is used almost entirely.



Section of Fire Door cut off after actual use—showing layers of wood unharmed.

**"Waterloo" Strongroom Doors**

Waterloo Strongroom Doors are built on the Fire Door principle, and are designed for fire protection more than burglar protection. They are fitted with a combination slide and 4-lever lock, however, which is proof against any petty thief.

The door is constructed of two thicknesses of 1/2-inch tongued and grooved boards, reinforced with sheet iron between. Nails are then driven at close intervals right through from back to front and cleated, and then the whole is encased with lock-jointed, tinned steel sheets, as with an ordinary fire door. A front panel of thinner wood is now added, over which is drawn a final sheet of specially flattened sheet steel. This is enamelled and gives a massive and ornamental finish to the whole door.

**Specification**

The Waterloo Standard Strongroom Door gives a daylight opening of 6ft. 3in. x 2ft. 3in. It is supplied

with a mild steel frame, which fits a reveal of 6ft. 5 1/2in. x 2ft. 7 1/2in., and is secured to wall with four splayed steel lugs.

(Continued on next page)



## "WATERLOO" ROLLER SHUTTERS

### Where Used

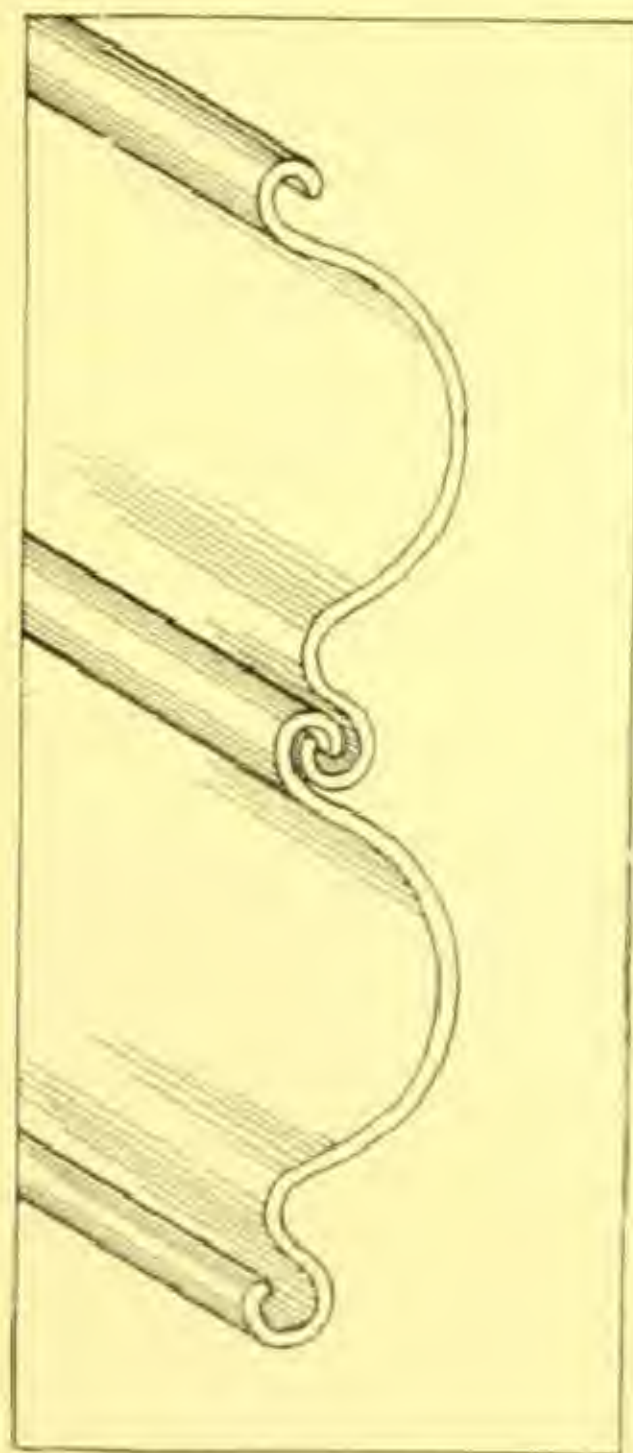
"Waterloo" Roller Shutters provide the ideal means of closing factory door-openings, garages, theatre windows, lift entrances, cartways, shop fronts, etc. They can be applied to almost any conditions, and have been made successfully up to about 25 feet in width. All the N.S.W. Government Tramways sheds have been fitted with these shutters, as well as many large Harbour Trust entrances, and those of large private concerns.

### Different Types

"Waterloo" Steel Roller Shutters are made in two gauges—17 and 21 gauge. The heavy gauge is rolled with wider slats and is recommended for large openings where heavy wind resistance is experienced. The 21-gauge slats for all ordinary openings.

### Construction

Steel Roller Shutters are constructed of rolled steel slats interlocked by sliding each slat along the one next to it, as shown in the accompanying diagram. To prevent these slats from sliding out of line, malleable iron nibs are riveted on to the end of each alternate pair of slats. The curtain is then fastened with metal thread screws to a steel drum, inside which is fixed a spindle on a spiral spring. Adjustment is given so that the tension of the spring can be set to give easy operation. Large shutters, however, cannot depend entirely on the spring, and so gearing is provided—operated by the hand chain—as shown in the diagram at side. Provision is made for locking by the use of a flat bolt attachment to the bottom rail.



Steel Interlocking Slats.

### Fire Underwriters' Shutters

Fire Underwriters' 21-gauge Steel Shutters must be automatic in closing, and so, by special gearing, held with a fusible link, they run down into position when released by the fire. They are used as a "cut-off" on fireproof stairways and in front of lift openings when coming up into the middle of a building. They must have a 3-inch cover on each side of the opening and also extend quite flat for three inches above the top before starting to curl away to the drum.

If the floor is not of fireproof construction, an iron checker-plate must be fitted on floor at opening.

### Space Required

For the most satisfactory job, 17 inches of headroom is required. Shutters can be erected, however, with less, but in this case, the curtain commences to curve away from the lintel at the top and, if set too low, when fully up, some of the roll will project into the opening. Measurements for side room are given in the diagram below for steel shutters, but garage shutters in wood can be erected with less.

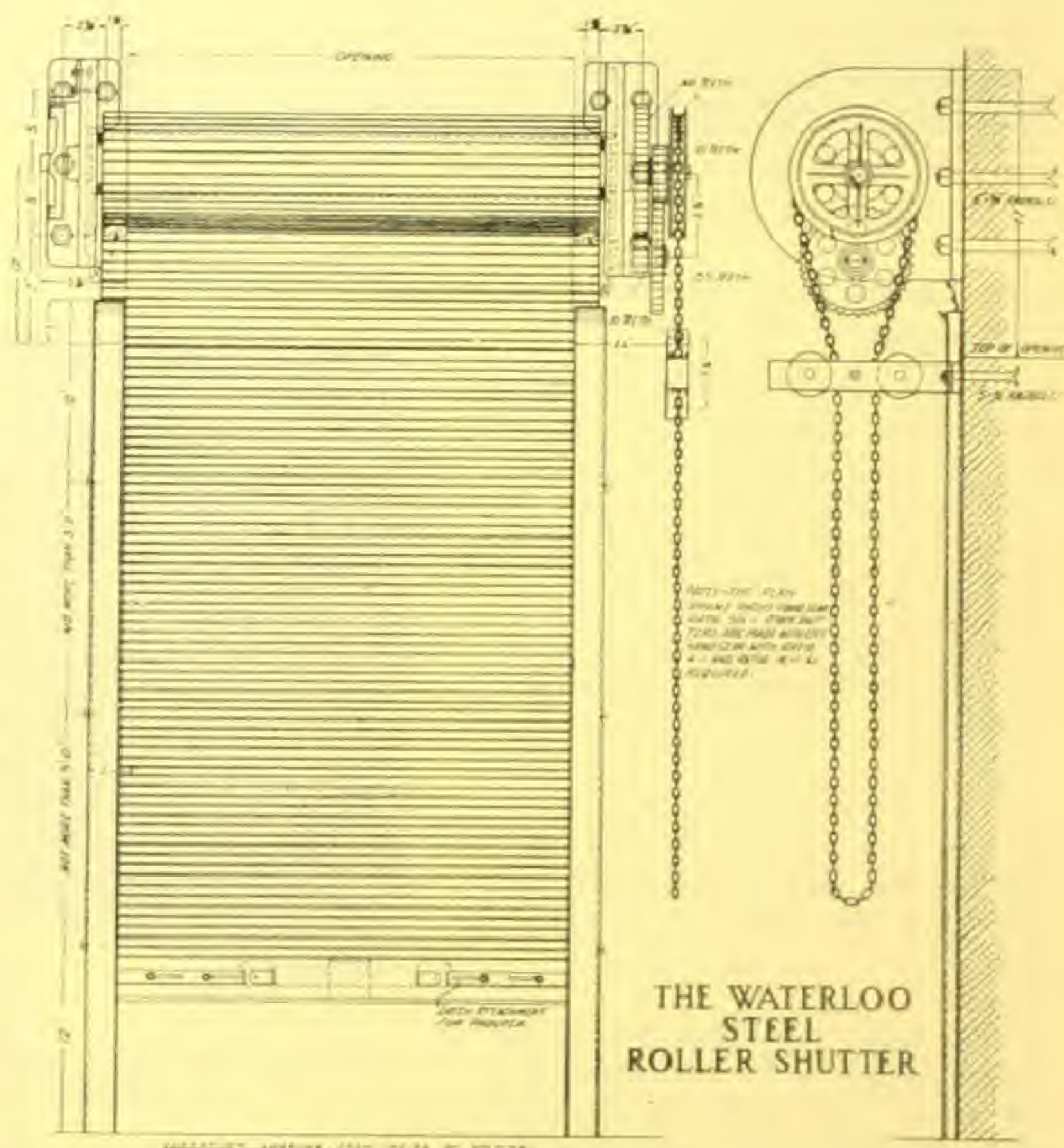
### Fixing

Roller Shutters are better fixed after the opening is completed. We prefer to do this and, wherever possible, actually carry out the work ourselves. If a contractor is going to do it, however, we supply blue prints giving details.

### WOOD ROLLER SHUTTERS

"Waterloo" Wood Roller Shutters are used mainly for private garage use, and because of their ease of operation and saving in room, are ideal. Hand chains are unnecessary for ordinary sizes, as they are spring balanced and require very little effort to raise or lower them— $4\frac{1}{2}$  inches of room is required at the sides and about 15 inches headroom. No great strength is needed in the lintel in this case, however, as the brackets carrying the drum and roller are secured to the wooden guides.

"Waterloo" Wood Roller Shutters are constructed of seasoned 11/16th inch redwood slats, drilled to take strips of copper and webbing strips, which are threaded at intervals of about 18 inches right through from the bottom rail and fastened to the drum at the top.



THE WATERLOO  
STEEL  
ROLLER SHUTTER

Gearing and Bracket Arrangements for Steel Roller Shutter.



# C. DOWELL & SONS PTY. LTD.

STEEL  
WINDOWS

General Office and Plant:  
REAR NICHOLSON AND SCOTCHMER STREETS,  
FITZROY, VICTORIA.

Interstate Distributors:

SYDNEY — The Austral Roller Shutter  
Works Ltd., 96 Harris Street, Pyrmont.  
BRISBANE — Messrs. Bernays & Anderson,  
125 Adelaide Street.

ADELAIDE — Messrs. George Wills & Co.  
Ltd., 31 Grenfell Street.

PERTH — Messrs. George Wills & Co. Ltd.,  
156 St. George's Terrace.

16e

S.A.A. File No.

## Products

Dowell Cottage Casement Windows; Metal Lift Fronts and Enclosures; Lift Doors and Lift Car Superstructures; Wrought-Iron Balustrades and Grilles; Collapsible Gates; Burglar Grille Bars; Dowell Solid Rolled Double Weathered Steel Casements; Dowell Industrial Steel Sash.

(See the following three pages  
for Windows.)

## Equipment and Facilities

Our equipment consists of a completely-equipped establishment devoted to the production of the above products. Facilities include designing, drafting, engineering and estimating departments, and a fully-equipped foundry, machine shop and finishing department. This organisation is thus able to offer to the architect a complete service covering the production of metal products.

## Ornamental Ironwork, etc.

In the fabrication of wrought iron balustrades, gates, grilles, etc., nothing but wrought iron of a tough, fibrous and uniform character is used. The iron is forged and smoothly finished, and, wherever welded or riveted, the joints are clean and accurately fitted.

Long experience in all classes of wrought iron work has developed a high standard of workmanship. One of our many successful jobs—the Ornamental Gates to the additions of the Victorian State Savings Bank—is shown. Estimates, designs and co-operation will be given gladly.



## Lift Enclosures and Cars

Lift fronts and enclosures being generally at the point of entrance to a building, it is most necessary that a design and finish in accordance with the importance and standing of the building be installed.

Our experience enables us to produce any kind of lift enclosure in metal. We make enclosures of steel diamond and square mesh and hollow steel construction with polished wire, glass or steel panels, in any desired finish.

We build all parts comprising the construction of entrances and lift cars, including all necessary mechanism and hardware. This results in proper operation and undivided responsibility. Lift cars are of all fire-proof construction, consisting of pressed steel finished in a wide range of finishes, including baked enamels, lacquer and imitation wood graining. They can be constructed to suit lift shafts in new or existing buildings. We are prepared to submit our designs or work off those submitted to us.



(Above) — Ornamental  
Iron Gates by C.  
Dowell & Sons Pty.  
Ltd., in State Savings  
Bank, Melbourne.

Architects: Stephenson  
& Meldrum.

T. & G. Building,  
Melbourne, in which  
Dowell Steel Case-  
ments were installed  
throughout.

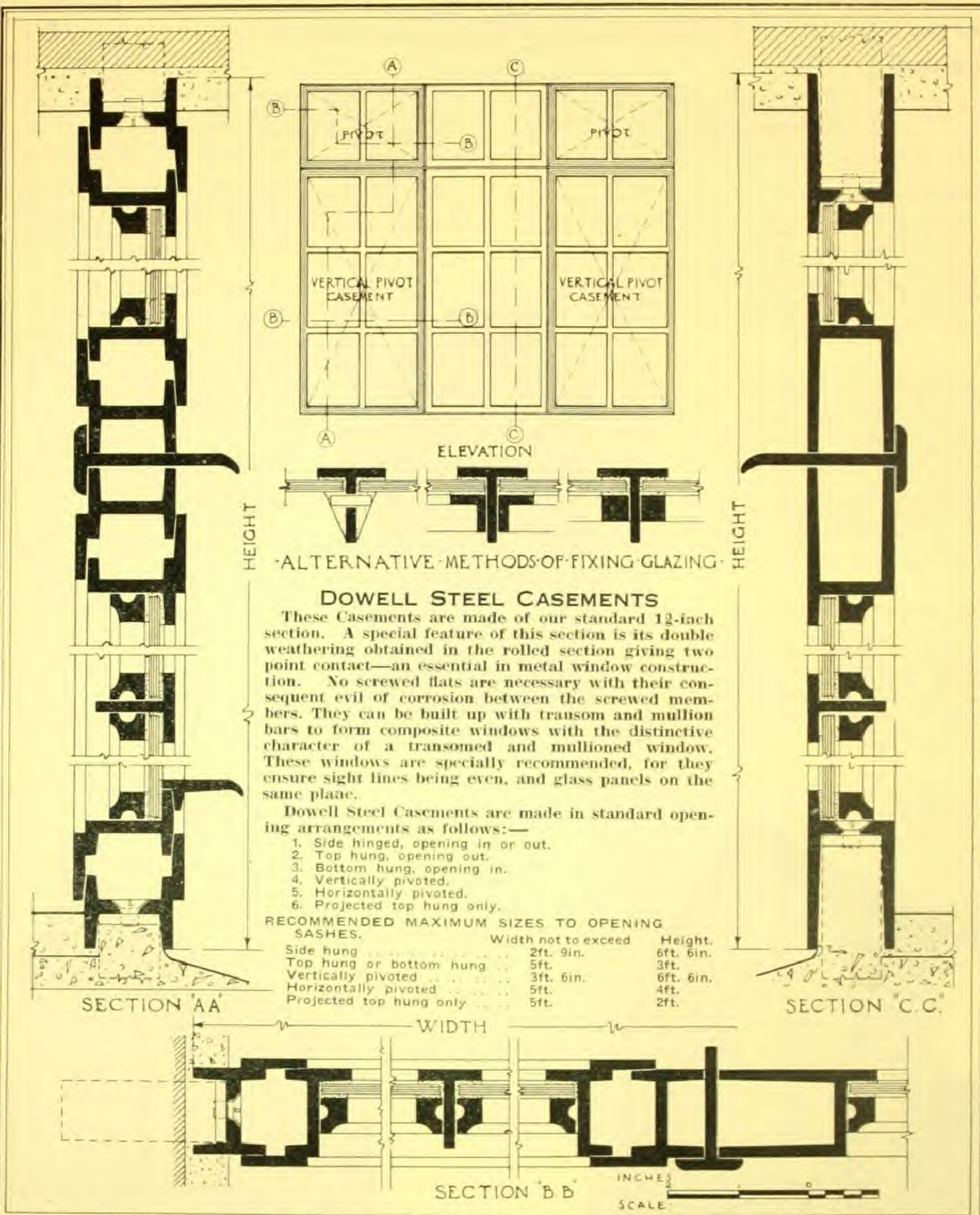
Architects: A. & K.  
Henderson.

Metal Lift Enclosure,  
Melbourne Town Hall.  
A typical example of  
the work of C. Dowell  
& Sons Pty. Ltd.



(Continued on next page)





C. DOWELL  
& SONS PTY. LTD.  
METAL  
WINDOWS.

## DOWELL'S METAL CASEMENTS

DRAWING  
No 1.  
23. APRIL '31.

(Drawn by the Architectural Staff of Ramsay's Catalogue)

(Continued on next page)



## ARCHITECTS SPECIFICATION FOR DOWELL STEEL CASEMENTS

## FRAMES AND SASHES.

All windows as shown on drawings shall be of the Dowell type of solid rolled double-weathered sections of at least  $\frac{1}{2}$  in. deep. No screwed facings shall be allowed. Bars shall be hydraulically straightened and have corner accurately machined and electrically welded, and shall be cleaned perfectly smooth and square. All sight lines shall be even, and glass on the one plane. Transoms and mullions shall be formed where necessary (or as shown on drawings) to obtain this arrangement. Glazing bars shall be of 1 in. x  $\frac{1}{2}$  in. tee sections (or as required by the Fire Underwriters' Association), tenoned and riveted to outer framing; where intersections occur they shall be formed by a method of overlapping interlocking joint. Glass shall be secured with the moulded metal beading accurately mitred at the corners.

## FITTINGS.

All fittings (hinges, fasteners, stays, cleats, latches, etc.) shall be of solid bronze (or gunmetal).

## PAINTING.

Windows shall be thoroughly cleaned of rust and scale and painted with two coats of rust-resisting paint before delivery.

## BUILDING IN.

General contractor shall be responsible for the proper setting and building in of the frames and the application of hardware as required. All opening sashes shall be left in proper working order.

Note.—Unless otherwise specified, all glass shall be provided for under another contract and secured by general contractor. Pins for putty glazing are supplied by us.

## DOWELL INDUSTRIAL WINDOWS

## Description

The Sashes are made of 1 in. x  $\frac{1}{2}$  in. tee sections, and the frames are generally of a heavier channelled section, which serves as a key for cement pointing. Two or more units of the sash may be coupled together by means of our standard mullions and transoms.

**GLAZING SIZES.**—With the exception of smaller sizes in opening sashes, glass sizes have been standardised to suit 18 x 12 in.

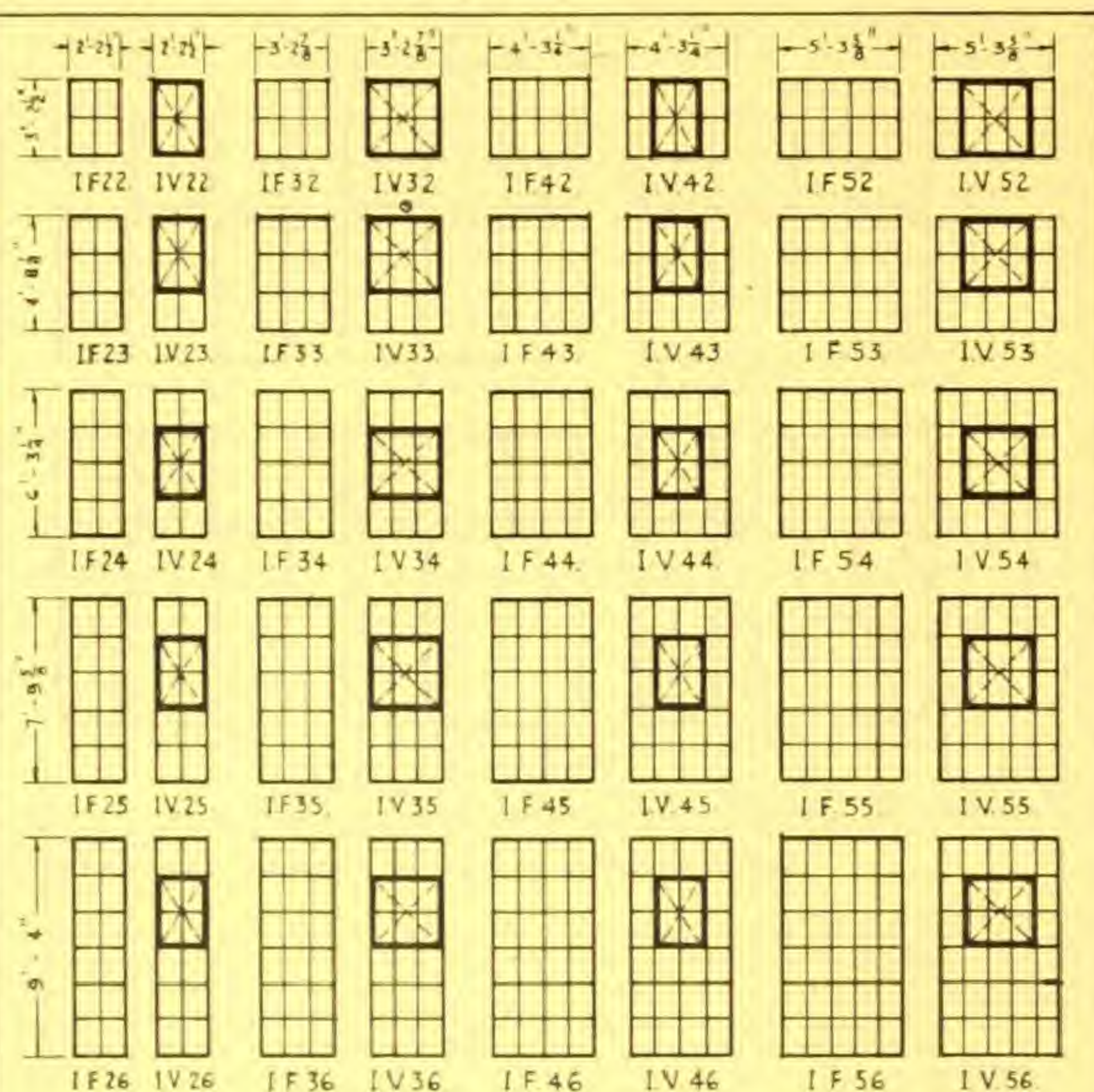
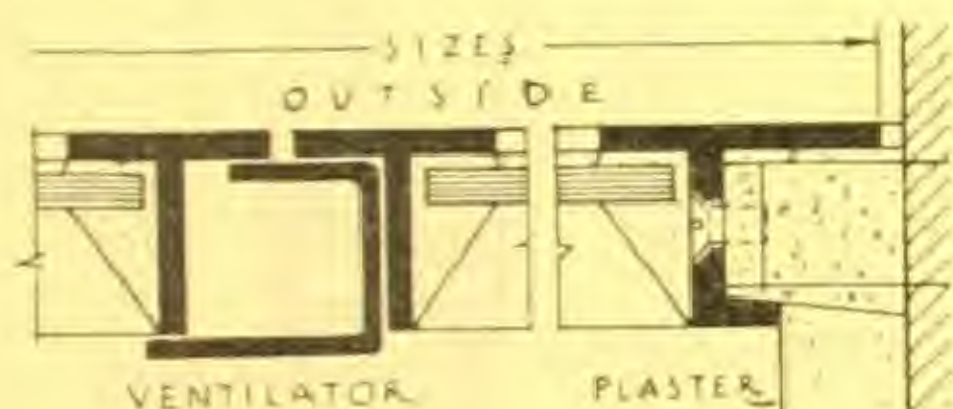
**FRAMES.**—All corners of the frame are welded, and glazing bars are tenoned and riveted; intersections are formed by the method of interlocking overlapping joints.

**SASHES** are made of 1 x  $\frac{1}{2}$  in. tee sections, welded at corners; glazing bars are of the same section. Around the outside a channel section is supplied, giving two-point contact between sash and frame.

**HINGES.**—Sashes are horizontally hung on steel pins turning in bronze bearings. These are adjustable so that they take up any slight discrepancies that may occur in erection.

**FITTINGS.**—Bronze spring-catch fastener with cord and cleat is the method of operating sashes.

**FINISH.**—All work is given one primary coat of rust-resisting paint before delivery.



NOTE WHEN ORDERING OR SPECIFYING USE THE SYMBOLS & NUMBERS GIVEN IN THE ABOVE DIAGRAMS

• DOWELL INDUSTRIAL WINDOWS •  
STANDARD TYPES AND SIZES

DRAWG. N°2.

## DOWELL STEEL RESIDENTIAL WINDOWS (COTTAGE TYPE)

Designed in convenient sizes to meet all requirements and with opening sashes as shown on the following page, they form an economic proposition within the scope of any prospective home builder. They are as cheap as wooden windows but give that characteristic simplicity of line which is only obtainable by the use of steel.

The opening sashes are not large and cumbersome, but are large enough to give all the desired ventilation required. Broken up into small panels of glass with light glazing bars they form a very rigid sash. The section of frame and sash used is 1 in. deep x  $\frac{1}{2}$  in. web, with glazing bars of 1 in. x  $\frac{1}{2}$  in. tees. All corners of

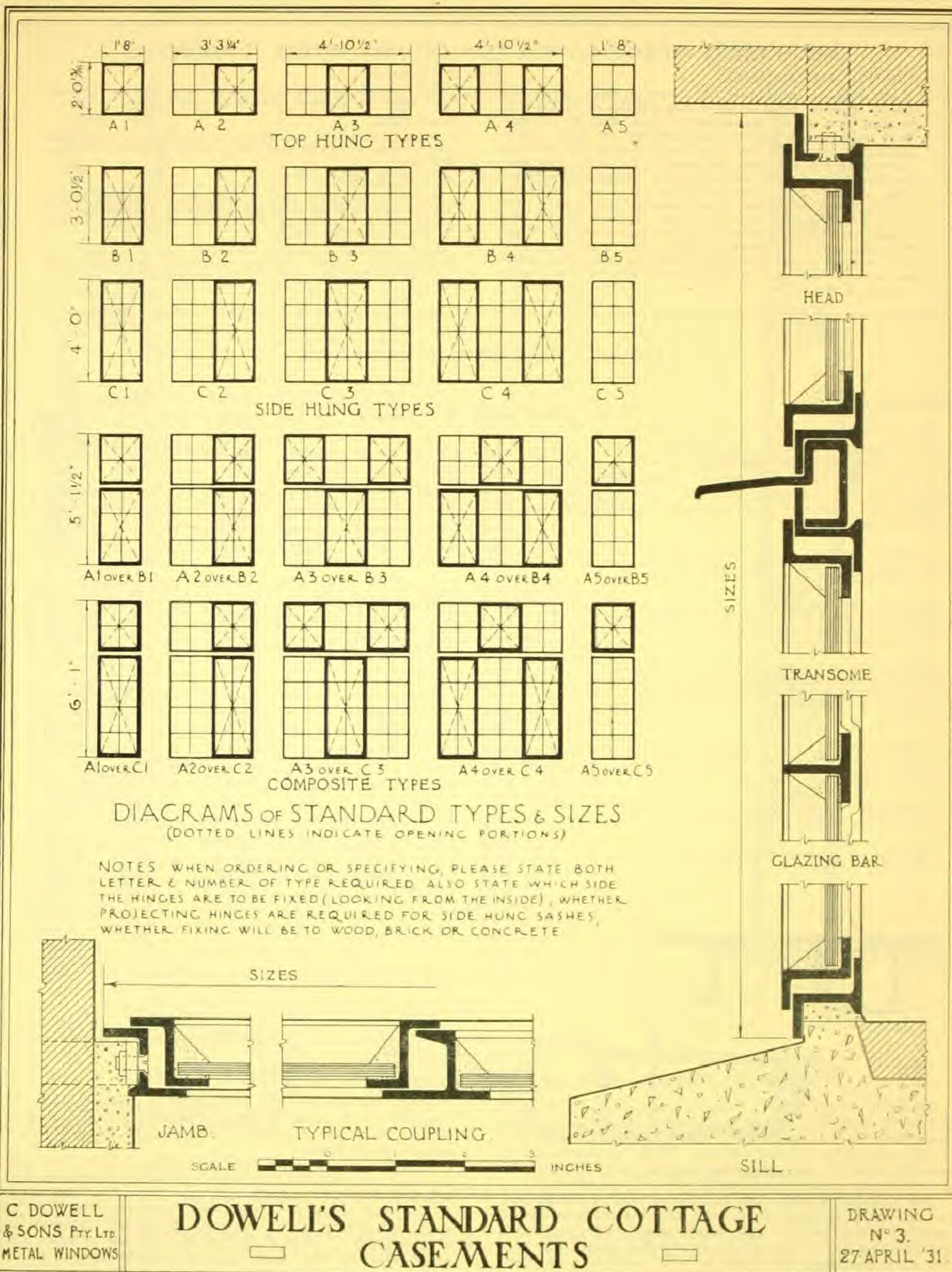
frames and sashes are welded, and glazing bar are tenoned and riveted to outer framing. Intersections of glazing bars are formed by the method of overlapping interlocking joints.

Sashes are hung on surface hinges with steel pins turning in gunmetal bearings. When required, projecting hinges can be supplied for easy cleaning from inside. Hinges and brackets to receive fittings are riveted to the sash and the frame. Casement stays and fasteners are of gunmetal. All glazing is done from the outside. All work receives one coat of rust-resisting paint before delivery.

(The drawings on this page were produced by the Architectural Staff of Ramsay's Catalogue)

(Continued on next page)





(Drawn by the Architectural Staff of Ramsay's Catalogue)





## J. CONNOLLY LIMITED

Structural Engineers and Blacksmiths

Reg. Office:

FITZROY IRON WORKS, 43-49 MOUNTAIN AND SMAL STREETS, SYDNEY.

Established 1884.

'Phone MA 4949.

14-16

S.A.A. File No.

### Products

Steel Window Frames, Steel Doors, Steel Fire Escapes, Suspended Steel Awnings, Wrought-iron and Bronze Balconettes, Balustrading, Grilles, Entrance Gates, Lift Doors, Lift Enclosures, etc.

### Facilities and Service

This house is replete with Modern Machinery, and the latest methods of construction are employed. Artisans who have been specially trained for the above-mentioned work are engaged, and every order, either large or small, receives expert and prompt attention. We shall be pleased to furnish Architects with designs, estimates and any other information that may be required on application. This service is entirely free and is executed without placing those concerned under the slightest obligation.

### Designs

Designs of any description can be carried out to conform with certain Architectural features, providing, of

course, the scheme is practicable. Architects can always be assured that their designs and specifications will be faithfully and properly observed, and that no deviation of any sort will occur unless their approval is obtained.

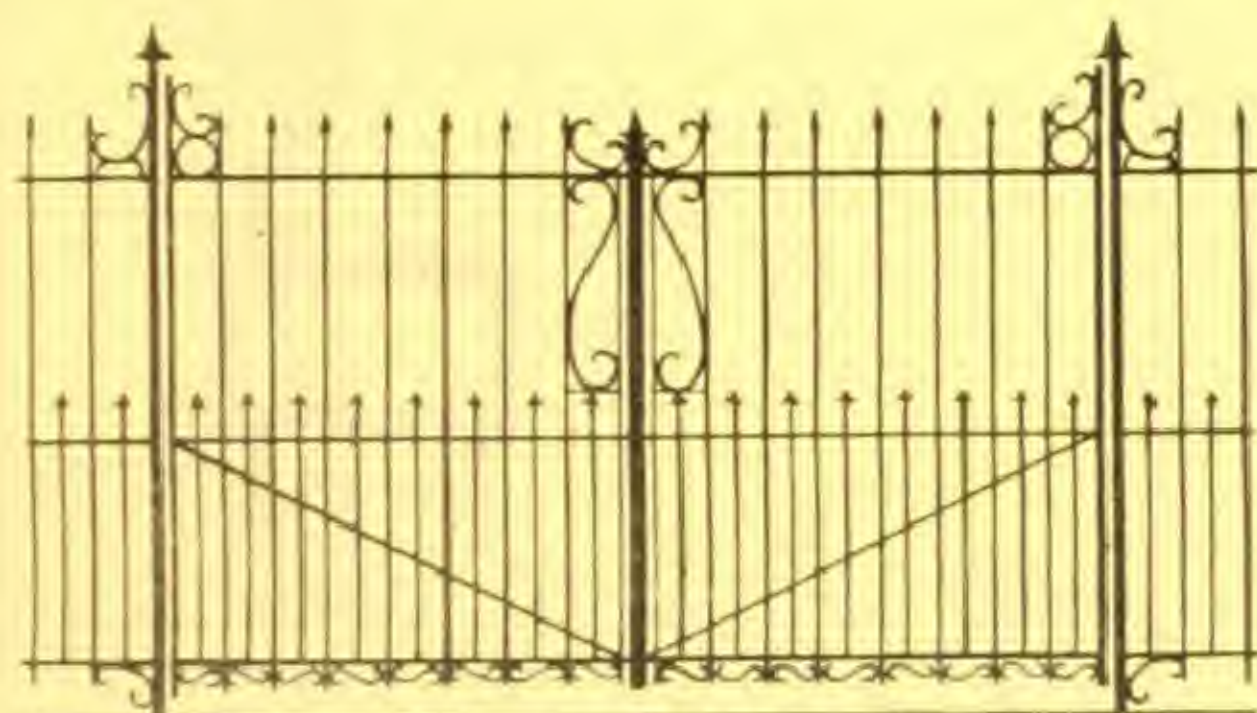
### Quality

The standard of workmanship of this house has been highly commended by some of the most prominent Architects of Sydney, and the compliments that we have received prove conclusively that they appreciate our efforts to give entire satisfaction. Our reputation for quality is such that under no consideration will we allow it to be jeopardised by the output of inferior work. Every job manufactured is subject to a stringent examination, and if there are any defects they must be remedied before the work is passed for delivery. Architects are cordially invited at all times to inspect their work, to make sure that all is in strict accordance with their requirements before delivery is made.

## ORNAMENTAL IRONWORK

### GATES AND FENCES

Wrought Iron Gates and Fences to meet all requirements are manufactured and supplied and, if desired, we will undertake to erect same in any city, town or suburb. Ornamental Gates of intricate designs present no difficulty, as we have supplied them to several of the principal buildings in Sydney, and are quite familiar with their construction. We pride ourselves as being the manufacturers of those beautiful gates, so much admired, which for many years graced the exterior of the Sydney Town Hall. These gates may now be seen at St. Joseph's College, Hunter's Hill.



Entrance Gates.

### BALCONIES AND BALUSTRADES

Wrought Iron Balconies and Balustrading, and Stair Panels to suit all architectural requirements are manufactured and supplied. These products may also be obtained in brass or bronze. The illustrations shown represent standard designs which, however, are only a few of the several designs that we have supplied.



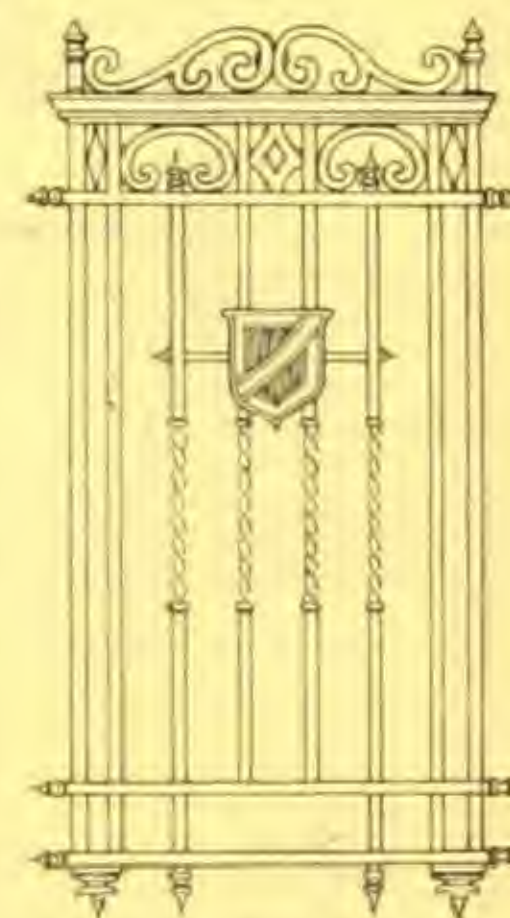
Balustrading.



Ornamental Grilles.

### ORNAMENTAL GRILLES

We have a reputation of many years' standing for this particular work and many of the finest examples in this city have been manufactured by us. Our present staff is familiar with this class of work and quite capable of making grilles similar in all respects to those used years ago when the demand was much greater. Architects can be assured that grilles of all types and sizes shall receive our very best and expert attention.



Grille.

### BRIEF LIST OF CONNOLLY WROUGHT IRON INSTALLATIONS

Adams Hotel; E.S. & A. Bank, George Street West; G.P.O., Sydney; A.B.C. Bank, Pitt Street; Wingello House; State Shopping Block; Esdailes Buildings; Administrative Office, Central Railway Station; Challis House.

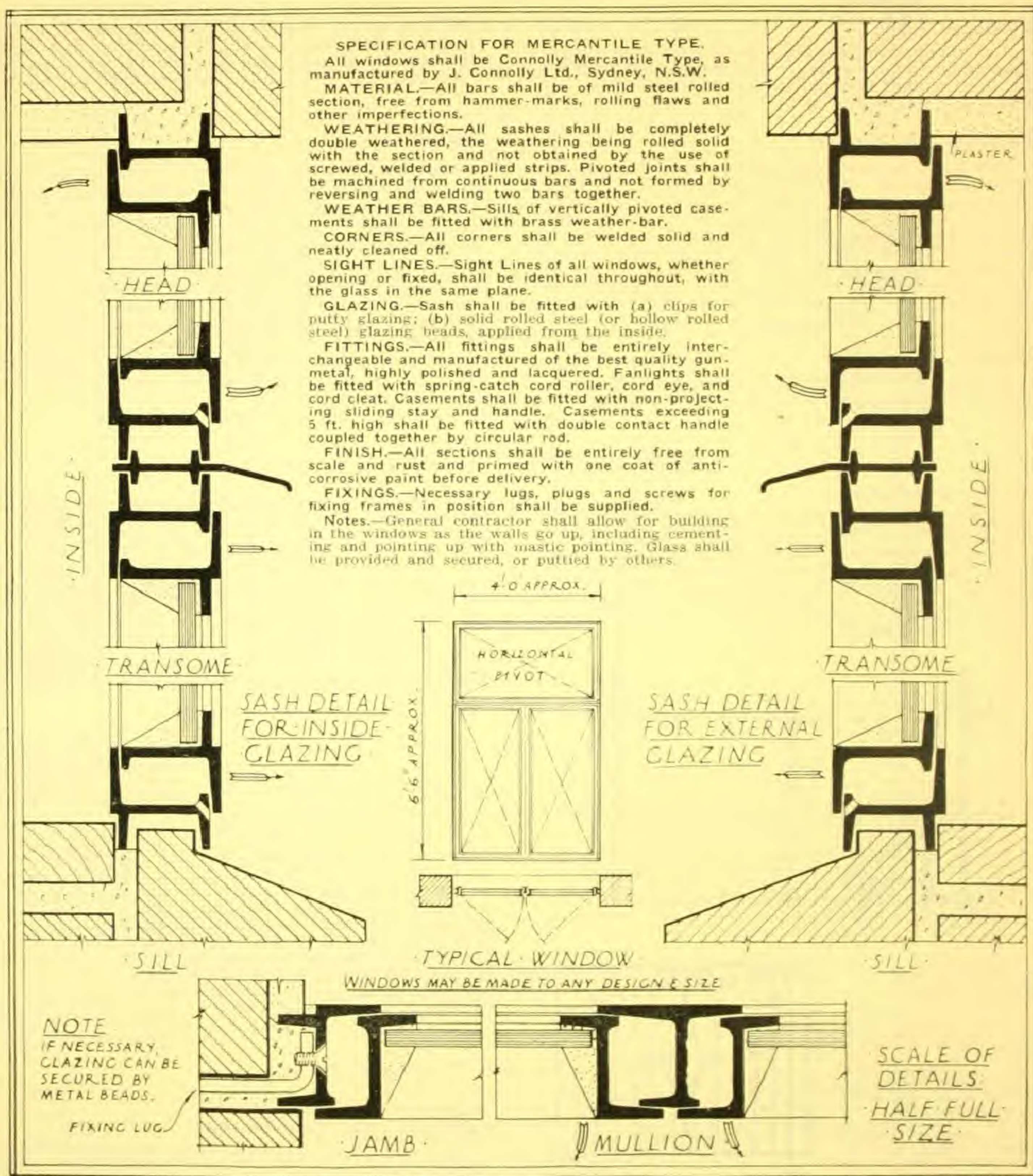
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## STEEL WINDOW FRAMES

Steel Window Frames, on account of the many advantages they have over wooden sashes, are gaining increasing popularity and are being used on buildings of all descriptions, i.e., Banks, Hotels, Warehouses, Office-buildings, Garages, Factories and Cottages, etc. The

Frames manufactured by J. CONNOLLY LIMITED have reached a high standard of efficiency, being constructed of double-weathered sections, which are absolutely weatherproof. The fittings used are of substantial and elegant designs, and are made of the best quality gun-metal, highly polished and lacquered.



(Drawn by the Architectural Staff of Ramsay's Catalogue)

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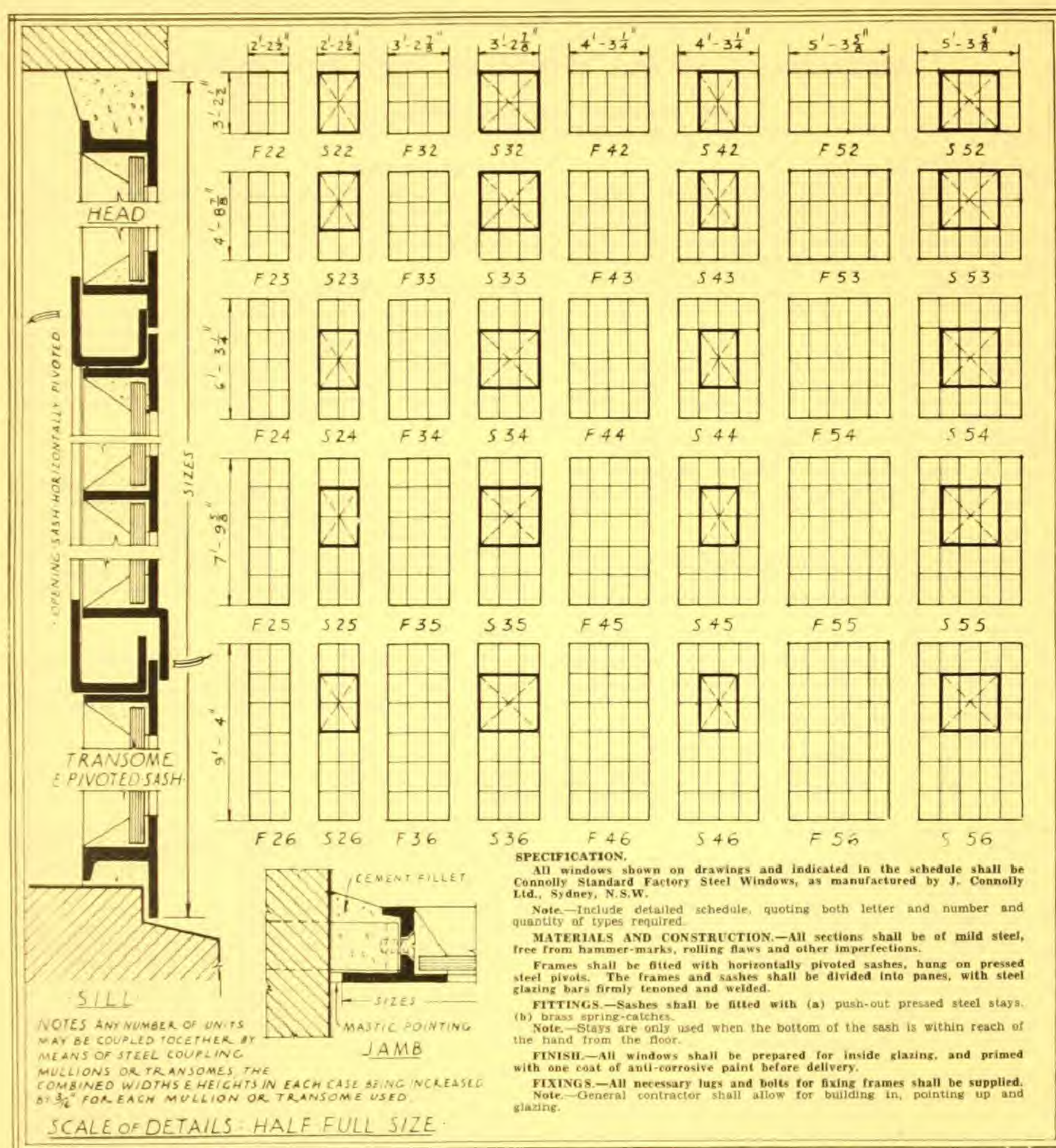


## CONNOLLY STANDARD FACTORY WINDOWS

These Windows are especially manufactured for heavy duty in all classes of Industrial Buildings. The opening sashes, horizontally centre hung on press steel pivots, have two-point contact weathering. The fittings are in all cases very substantial and suitable for the heavy service that they will be required to perform. Glazing is

on the inside, thus simplifying replacement of broken glass.

Stock sizes are as listed below. The sizes given are over all dimensions of the sashes, and allowance must be added for going into openings.





	<p style="text-align: center;"><b>WORMALD BROS. LIMITED</b></p> <p style="text-align: center;">FIRE PROTECTION ENGINEERS SINCE 1889</p> <p style="text-align: center;">CITY OFFICE: 19 BLIGH ST., SYDNEY. FACTORY: YOUNG ST., WATERLOO, SYDNEY</p> <p style="text-align: center;">BRANCHES:</p> <p>MELBOURNE—180 Bay St., Port Melbourne.      BRISBANE—"City Buildings," Edwards St. NEW ZEALAND—"T. &amp; G." Buildings, Wellington.      ADELAIDE—Bowden. PERTH—Wellington St.</p>		
16c			
S.A.A. File No.			

[For Other Products, See Pages 148, 244, 264 and 308]

## "METALBILT" METAL WINDOWS AND SUN BLINDS

### THE PATENT METAL WINDOW

(See Diagrams on Next Page)

#### Advantages of "Metalbilt"

"Metalbilt" Windows are new in principle and design. They are made entirely in Australia in our own factories, so that service is always available. They are really metal-covered windows of the box-frame type, worked by Pullman-type spring balances, without sash weights or cords. They offer the maximum light area, perfect ventilation, simplified operation and the longest possible life.

#### The Sash

The sash, as shown, is made of best seasoned wood on a steel frame for strength and the outer and inner surfaces are covered with soft drawn copper. The glass is secured by the wood beading. Rollers are provided at sides, which prevent any play, and so make the sashes absolutely rattle-proof. All fixing of the fittings is through the steel frame direct to the wood core by screws. It is to be noted that the weathering is a very prominent feature of this window.

#### The Frame

The frames are made of specially rolled and tempered black steel sheets, pressed to various shapes to suit the particular style of building construction, and are secured to the walls by plates and small angle brackets spaced at suitable intervals. This is a most convenient method of fixing and facilitates removal of entire frames if required by building alteration at any time. The whole frame is protected by a suitable anti-corrosive medium, as required and, if necessary, can be copper covered to all exposed portions by arrangement.

#### Easy Movement

As all moving gear is enclosed, the action of sliding sashes is at all times perfect—the arrangement of rollers enabling the sashes to be opened or shut from the side as easily as from the centre.

#### Principle of Operation

The principle of operation of "Metalbilt" Windows does away with the necessity of bulky mullions and the consequent loss of daylight area and ventilation. The spring-balanced type of sash having been used for many years very satisfactorily in wood window types, we can unhesitatingly recommend this type of balanced sash to give long and trouble-free life.

#### Fixing

Frames are built in as the erection of a building requires (as described under the heading "Frame"), the sashes being fitted at a later date. Full erection detail plans are supplied by us and the whole of the work is supervised by our experts until the whole job is completed. Arrangements can be made, if required, for us to erect the windows and also to glaze the sashes.

#### Sizes

As each proposed new building in the main requires a certain size of window opening, we make each job a special one, but full details of the most suitable and economical manufacturing sizes will be supplied by us on request.

## THE SUN BLIND

(See Next Page)

#### Description and Advantages

"Metalbilt" Sun Blinds are also an Australian invention made in our own factories and supply a most effective protection against the sun and at the same time allow a maximum amount of light and air to enter. Light is admitted by being deflected from the splayed face of the slat up against the inside surface of the one above it. This gives a soft translucent effect.

The blind is absolutely rattle-proof, and the winding gear, by interior handle, is so designed that the slats can be stopped in any position that may be desired.

The channels in which the blind slats run are a wood core section covered in drawn copper.

#### For All Types of Construction

"Metalbilt" Sun Blinds can be fitted either internally or on outer faces according to accessibility of the building, and we would point out that the guides are easy to conceal owing to their extreme narrowness—the only room required being in the head.

#### Construction

The blind slats are constructed of best black steel sheets, pressed to shape, which obtain extreme strength

from being turned back at either extremity. These flat surfaces make contact as the winding gear is turned, thereby causing the blind slats to pick one another up as they are raised.

These blinds have been turned out in great widths, and are working satisfactorily to-day in openings over nine feet wide in one movement. Any special problems would always be investigated by us with pleasure.

Should it be desired to avoid the use of steel, we would point out that aluminium has been used most successfully in the construction of "Metalbilt" Blinds.

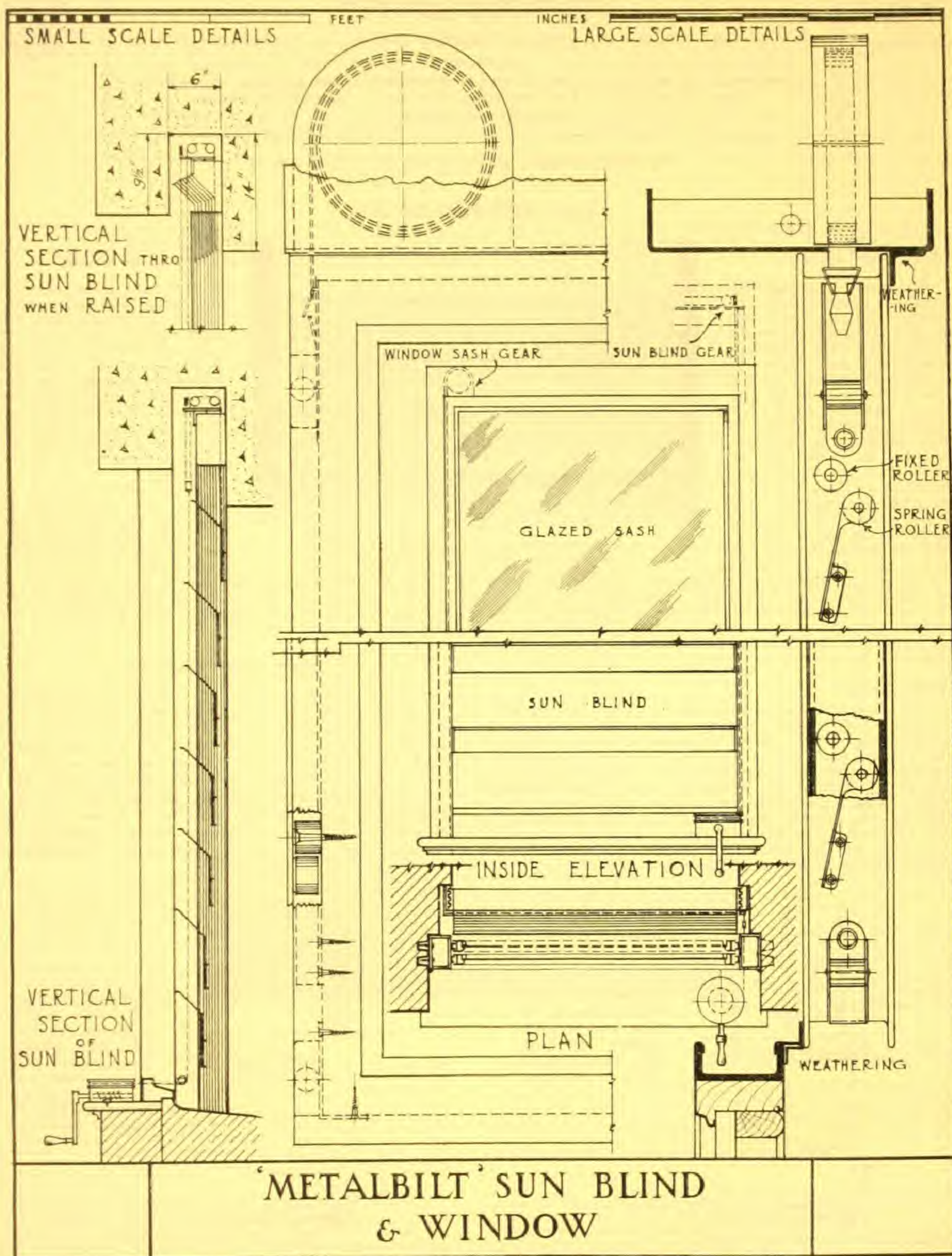
#### Fixing

The blind guides are fixed to the walls by small brackets, which are adjustable and can be regulated to suit any opening which may have varied slightly from the proposed sizes during construction.

The amount of headroom required is as shown, but in the case of existing buildings all this space which is occupied by the blind gear does not project into the window opening itself, as due allowance has to be made for the existing frame and sash sections.

(Continued on next page)





(Continued on next page)



# WORMALD BROS. LIMITED

FIRE PROTECTION ENGINEERS  
SINCE 1889

CITY OFFICE: 19 BLIGH ST., SYDNEY. FACTORY: YOUNG ST., WATERLOO, SYDNEY

## BRANCHES:

MELBOURNE—180 Bay St., Port Melbourne. BRISBANE—"City Buildings," Edwards St.  
NEW ZEALAND—"T. & G." Buildings, Wellington. ADELAIDE—Bowden.  
PERTH—Wellington St.



14k

S.A.A. File No.

[For Other Products, See Pages 148, 244, 264 and 308]

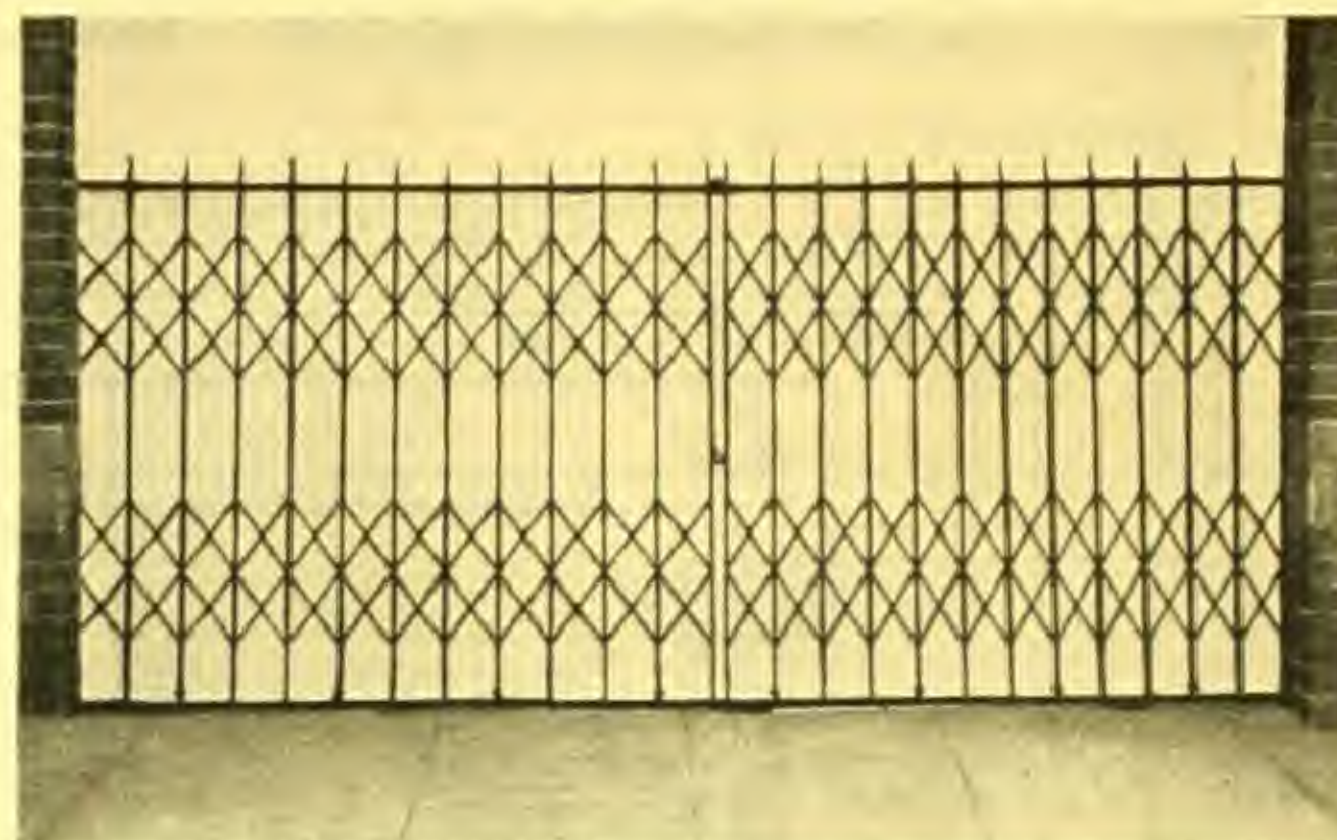
## COLLAPSIBLE GATES

### "Waterloo" Gates

"Waterloo" Collapsible Gates are adaptable to any opening and can be made up to widths which would prohibit the easy handling of any other gate. They can be made as fixtures to the sides with movable top and bottom bars and, when "collapsed," can be made to hinge back out of the opening. If the sides of an opening are not sufficiently strong to support the gate, removable standards can be fitted. For smaller gates, where the height is greater than the width, the top and bottom bar can be swung into an upright position alongside the gate channels and the whole then hooked together. Collapsible gates have also been very successfully used in private homes over windows as a protection against burglars. They enable the window to be open for ventilation, yet making it impossible for anyone to enter.

### Construction

"Waterloo" Collapsible Gates are made of either  $\frac{1}{2}$ -in. or  $\frac{3}{8}$ -in. channel iron, fastened by two groups of flat wrought iron strips. These are fastened at the centres with a loose pin and the ends are left free to slide in the channel with the operation of the gate. Rollers are fixed at intervals at the bottom to slide on the bottom roller. Where standards are needed, they are usually made of 1-in. square bar iron, finished off at the top with an ornamental moulded spike. The channel iron gate laths can be finished off "square," "spiked," or slightly curled in the shape of a "spear-head."



A Standard "Waterloo" Collapsible Gate with "Spearhead" Finish.

Where standards are necessary, iron boxes are set into the ground and the standards let into them. When desired, dust caps are provided for protecting them when the standards are out.

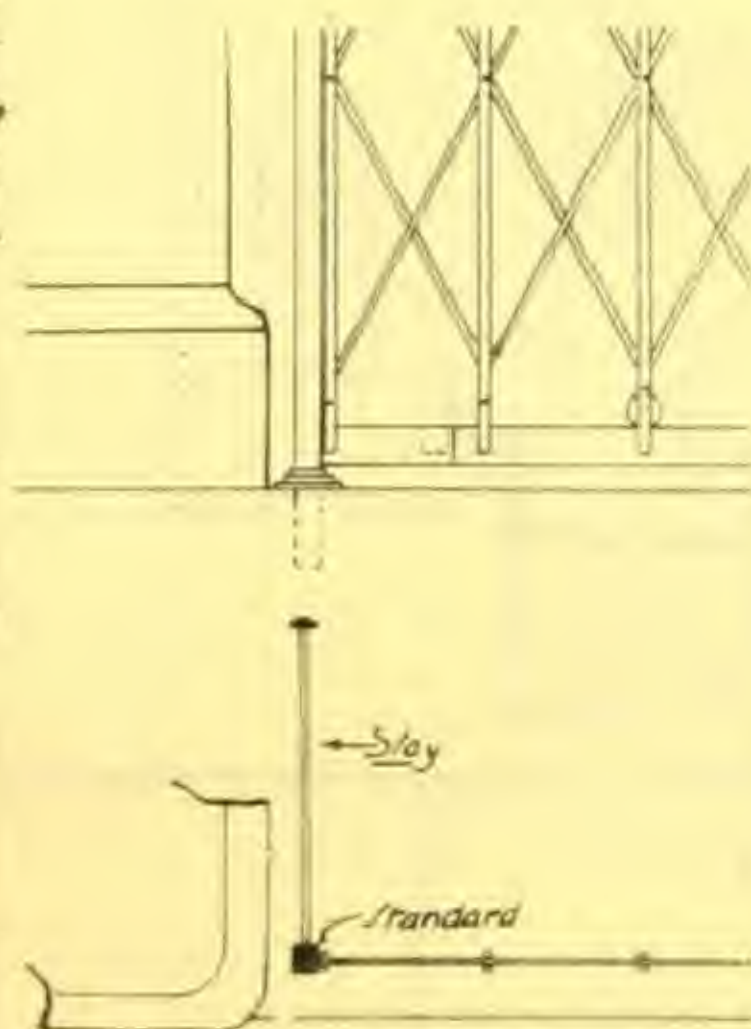
### Method of Fixing

There are no set methods for fixing collapsible gates, as the conditions vary with each job. We therefore make each gate to suit the particular needs. However, wherever possible, rag bolts are cemented into the masonry with wrought iron lugs attached. These are made to hold the top and bottom rails in a groove provided.

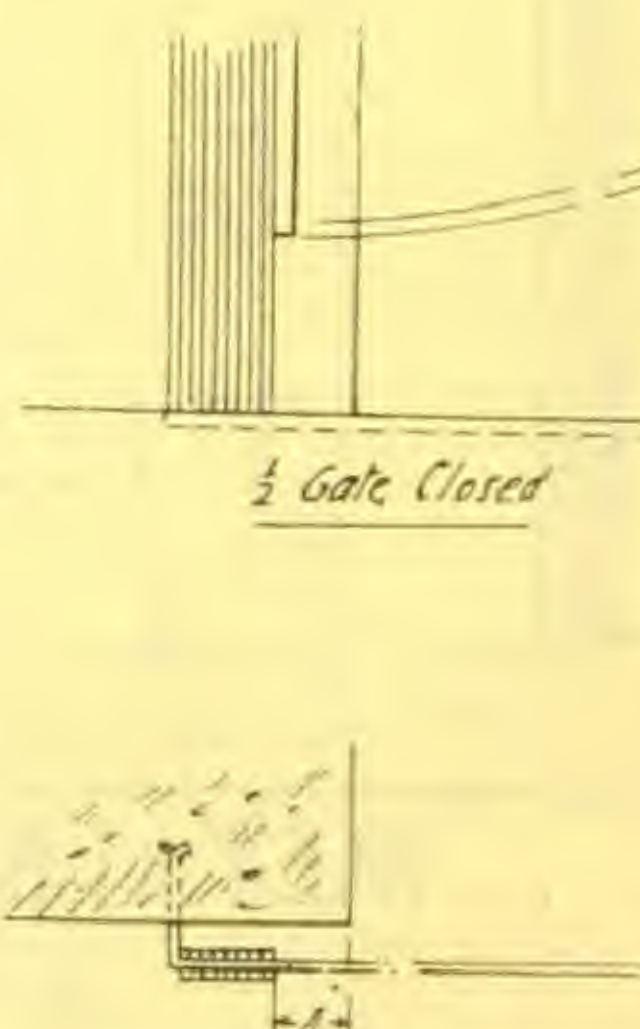
When the gate is to swing back flush with the opening, the lugs are fixed as usual and the gate suspended on bearings hooked into them.

## LIFT CAR GATES

Lift Car Gates do not vary greatly from ordinary collapsible gates, but several rules regarding fixing must be carried out. The only requirement of manufacture is that the bars of the gate must be four inches from centre to centre instead of the usual six inches. The top bar is made a fixture and the bottom runs in a channel sunk into the floor of the lift car. The gate must be set back not less than three inches from the front of the car floor. No special fixing is required, and we suit each gate to the particular conditions of the job.



Elevation and plan showing section of gate with movable bottom rail and side standard made to lift out.



Elevation and plan of gate with hinged top rail and fixed bottom rail set into ground. Gate in this case slides back past pier to give full clearance.

Showing various methods of fixing.



# CHUBB'S AUSTRALIAN COMPANY LTD.

With Which is Incorporated  
RICHARD BROTHERS

Art Metal Workers

164 CLARENCE STREET, SYDNEY.

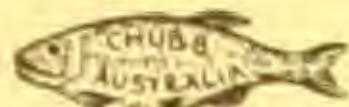
120 QUEEN STREET, MELBOURNE.

Works at ELIZABETH STREET, WATERLOO, SYDNEY.

Agencies At:

BRISBANE: James Campbell & Sons Ltd. ADELAIDE: Burns, Philp & Co. Ltd.  
PERTH: Harris, Scarfe & Sandovers Ltd. HOBART: Charles Davis Ltd.  
WELLINGTON, N.Z.: A. C. Gillies & Laird Ltd.

REGISTERED



TRADE  
MARK

18

S.A.A. File No.

## MADE IN AUSTRALIA PRODUCTS

Strongrooms; Safe Deposits; Reinforcements for Strongrooms; Strongroom Doors; Safes; Steel Grilles; Steel Shelving; Locks; Two-Speed, Bi-Parting, and Single Sliding Hollow Metal Lift Doors; Chubb Patent Lift Door Closers and Oil Checks; Pressed Metal Lift Cars; Hollow Metal Office Doors and Partitions; Pressed Metal Jambs, Architraves, and Skirtings; Wrought-Iron Entrance Gates; Wrought-Iron Balustrading; Collapsible Gates.

### STRONGROOM DOOR.

The progress of Metallurgical Science, the introduction of higher temperatures with the Oxy-Flame, and the growing knowledge of the use of liquid explosives, have been the guiding factors in the construction of CHUBB DOORS.

The door of any strong-room must be at least 50 per cent. stronger than its walls, as records prove that attacks are more numerous on door than on walls.

The door illustrated is the type that should be adopted for small strong-rooms, and is manufactured of tough steel, one-piece castings, into which Chubb Anti-Blow-Pipe and Drill-Resisting Alloy is poured. The bolt work is controlled by at least two Keyless Combination Locks, which give over a million different combinations, and the dials of these locks can be controlled by a Dial Check Key-lock, the keyhole of which does not pass through the main door slab.

The frame of the door is connected to the frame of the ventilating gate by tough steel vestibule plates.

### MANHOLE OR EMERGENCY DOOR.

This is similar in strength to the principal entrance door, serving the purpose of admission to a strongroom—caused by a lockout—and also providing the means of suitable ventilation system, by means of swinging air ducts from the forced air system throughout any modern building.

### TANGBAR REINFORCEMENT.

Rapid developments of scientific methods in use among modern cracksmen has made it absolutely essential that the walls, floor and roof of all strongrooms should be impregnable to all methods of attack.

In Tangbar construction, the Tangs radiate from a central spiral rod at all angles, and in all directions, avoiding any concentrated mass of metal; thus every part of the walls, floor and roof is reinforced by some section of the Tangbar, and when the concrete becomes set, the bond is particularly effective, and the interlocking of the Tangs gives the corners enormous strength.

Illustrations on Drawing S. 1238A (page 162) show various details of this latest security reinforcement.

The strength of any strongroom must not be gauged by the thickness of its walls, or by the stress and strain of its rod reinforcement, but by the hours of resistance which Tangbar has been designed for.

CHUBB



CHUBB'S ANTI-BLOW-PIPE STRONGROOM DOOR FOR BRANCH BANKS.

### SPECIFICATION.

Supply and install, as shown on plans, a Chubb Anti-Blowpipe Strong-room Door. A masonry opening to be formed, in accordance with drawing to be supplied by Chubb's.

### STEEL LINING.

The advantages of a steel lining to a strong-room in conjunction with the use of Tangbar Reinforcement are many; one of which is that it gives greater hours of resistance because the penetration is impeded by the fact that the concrete is only broken off in very small lumps, which have to be withdrawn through the opening.

A steel lining also gives a dry atmosphere to a strongroom.

Concrete walls are now being attacked successfully with the Blow-pipe Flame until extremely hot, and then cold water is thrown on them, which severely fractures the concrete work. By the adoption of a steel lining, a very useful last line of defence is added to the construction, and this also prevents, or makes it impossible for the door frame to be removed, as this is securely fixed to the steel lining. See Drawing No. S. 1238, page 162.

### SPECIFICATION.

Lining is to be Chubb's Machined Rebated Steel Lining, fitted with special lugs for concrete.

The Contractor to form the concrete base, which must be perfectly level, and to properly strut in all directions the steel lining, so as to take the weight of the concrete during the pouring of the walls and roof.

Severe tests on walls by engineers have proved that the irregular form of Tangbar offers unsurmountable obstacles to the attackers.

In many existing strongrooms, heavy steel bars are generally laid in the middle of the thickness of the walls in the form of a cage, but, with this arrangement, the concrete in front of the bars can be easily broken away without meeting any of the heavy steel bars, and when the bars are reached, can be cut with comparative ease with the blow-pipe.

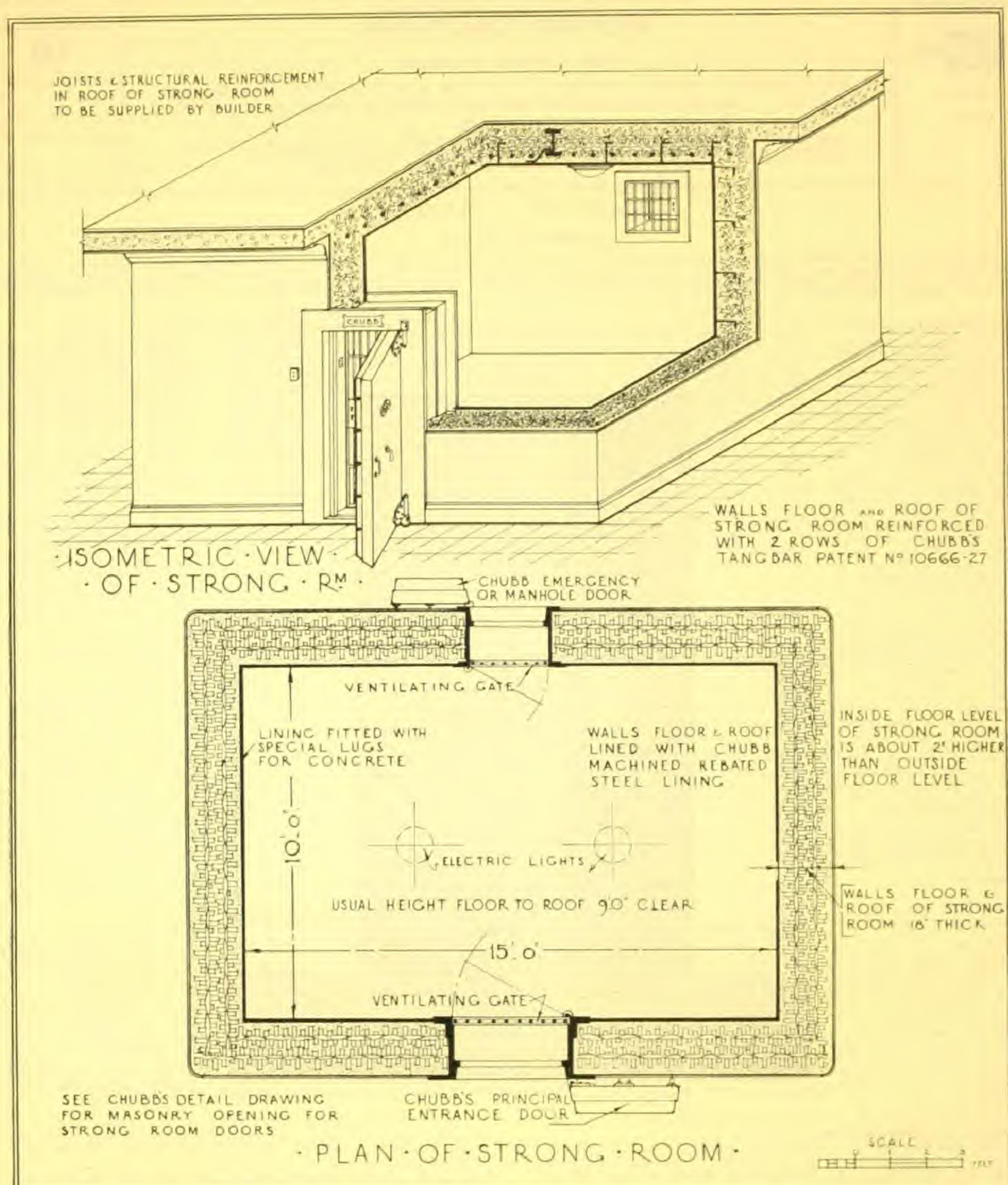
### SPECIFICATION.

The walls, floor and roof to be reinforced with two rows of Chubb's Patent Tangbar, which will be delivered on the site, and erected and supervised by Chubb's experts.

The Contractor is to afford any facility and assistance in placing the Tangbar in position, and to have the forming adequately braced and perfectly plumb.

(Continued on next page.)



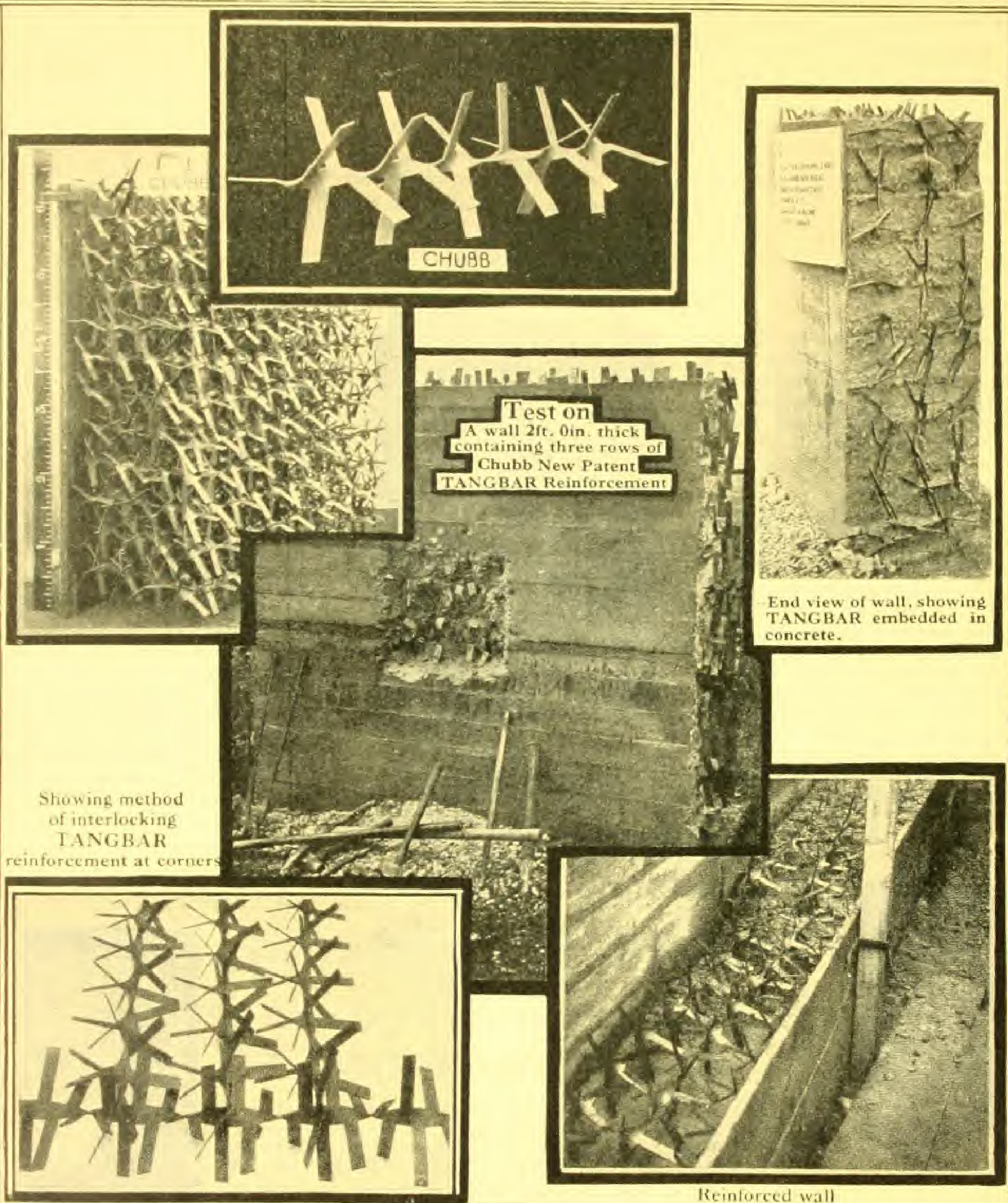
REGISTERED  
TRADE

CHUBB'S BRANCH BANK STRONG ROOM  
REINFORCED WITH 2 ROWS OF  
CHUBB'S TANGBAR REINFORCEMENT  
& COMPLETE WITH STEEL LINING

DRAWING  
NO S 123823<sup>RD</sup> APRIL  
1931

(Continued on next page)





End view of wall, showing TANGBAR embedded in concrete.

Showing method of interlocking TANGBAR reinforcement at corners

Reinforced wall



CHUBB PATENT TANGBAR  
REINFORCEMENT FOR WALLS  
FLOOR & ROOF OF STRONGROOMS

DRAWING  
N°S 1238A  
23<sup>RD</sup> APRIL  
1931.



## WM. BEDFORD LIMITED

476-490 LITTLE LONSDALE STREET  
MELBOURNE

18

S.A.A. File No.

Australasian Agents for:  
LIPS' SAFE AND LOCK WORKS LTD.,  
LONDON AND HOLLAND

LIPS

[For Other Products, See Pages 137, 246, 328, 415]

## SECURITY DEPARTMENT

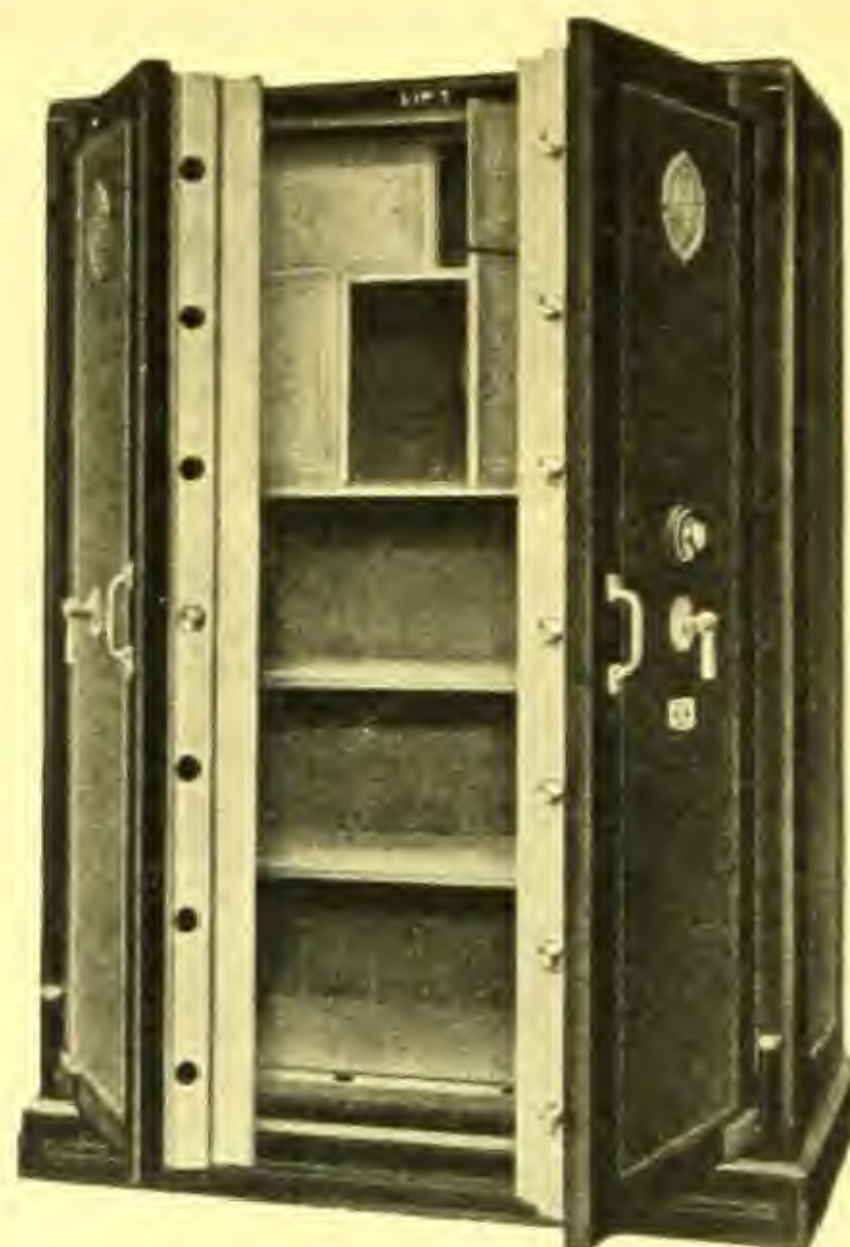
## Products

Safes in eight grades, Strong-room Doors, Safe Deposits, Wall Safes, Roller Shutter Cupboards, Steel Cupboards, Steel Shelving for books, Steel Shelving and Partitions for Strongrooms.

## Lips' Reputation

On the Continent of Europe the name of Lips is a household word where security devices are known.

It is acknowledged that the cracksmen's "profession" reaches its highest "standard" on the Continent, and Lips have, during the last 50 years, stood in the front rank of manufacturers, and are always the first in the world to introduce new improvements to combat the latest developments in the methods adopted by the enterprising members of the "nefarious profession."



"C" Quality.  
Branch Bankers' Quality.

## Information to Architects

Before specifying security products, ask for a complete list of Lips' various grades of Safes and Strong-room Doors.

Lips state the precise degree of protection which each of their manufactured units afford, and so, the purchaser knows exactly what his Safe or Door is capable of withstanding.

The Agents have a complete range of these products, and would be pleased to demonstrate to you.

Ask for a copy of "Why a Lips' Safe or Strongroom Door is Preferred," also for the list and illustrations of prominent installations of Safes, Strongrooms and Safe Deposits in the most important banks of the world.

## Fire-Proofing

All Lips Security Products are provided, between the inner and outer bodies, and in the doors, with thick layers of Lips Steam-Generating Non-Conducting Composition, which effectively protects the contents of the Safe from scorching in cases of fire.

## LIST OF SAFES AND STRONGROOM DOORS.



The Branch  
Bankers' Quality,  
as supplied to  
Prominent  
Australian  
Bankers and  
Insurance  
Companies.

Type	Purpose	Particulars of Protection.
<b>SAFES—</b>		
A Type . . .	Book Safe . . .	Fire-proof, Thief-resisting.
B Type . . .	Warehouse Safe . . .	Fire-proof, Fall, and Burglar-resisting.
C Type . . .	Branch Bankers' Safe . . .	Fire-proof, Fall-proof. Sincere protection against the Burglar.
L Type . . .	Book Safe . . .	Fire-proof, Fall-proof.
P Type . . .	Branch Bankers' Safe . . .	Fire-proof, Fall-proof. Entirely armoured, protection against blow-pipe over vital lock parts.
E & F Type	Bankers' Safe . . .	Fire-proof, Blow-pipe-proof. Complete protection against "Thermite" and the electric arc. Also Wall and Crane-Hinged Safes.
<b>STRONGROOM DOORS—</b>		
003 Type . . .	Book Safe . . .	Protection against Fire, Thief-resisting.
102 Type . . .	Book Safe . . .	Protection against Fire, Burglar-resisting.
202 Type . . .	Branch Bankers' . . .	Fire-proof; Sincere protection against the Burglar; Protection against Blow-pipe over vital lock parts.
302 Type . . .	Bankers' Quality . . .	Complete protection against Fire, Burglary and Blow-pipe.
402 Type . . .	Bankers' A1 Quality . . .	Complete protection against Fire, Burglary and Blow-pipe, with Inter-locking Step Frame.
502 Type . . .	Bank Head Office Quality . . .	Complete proof against Fire, Burglary and Blow-pipe, with bright steel Inter-locking Step Frame; heavy construction.
601 Type (Crane Hinged)	Bank Head Office Quality . . .	Complete proof against Fire, Burglary, Blow-pipe and Explosives, with Crane Hinge and Screw Compression Mechanism.



"A" Quality.  
Warehouse Quality.



## SECTION G

[Containing S.A.A. Filing Section No. 19]

## CARPENTRY





# THE ASSOCIATED COUNTRY SAWMILLERS OF NEW SOUTH WALES

UNION HOUSE,

GEORGE STREET, SYDNEY

Phone: B 1245

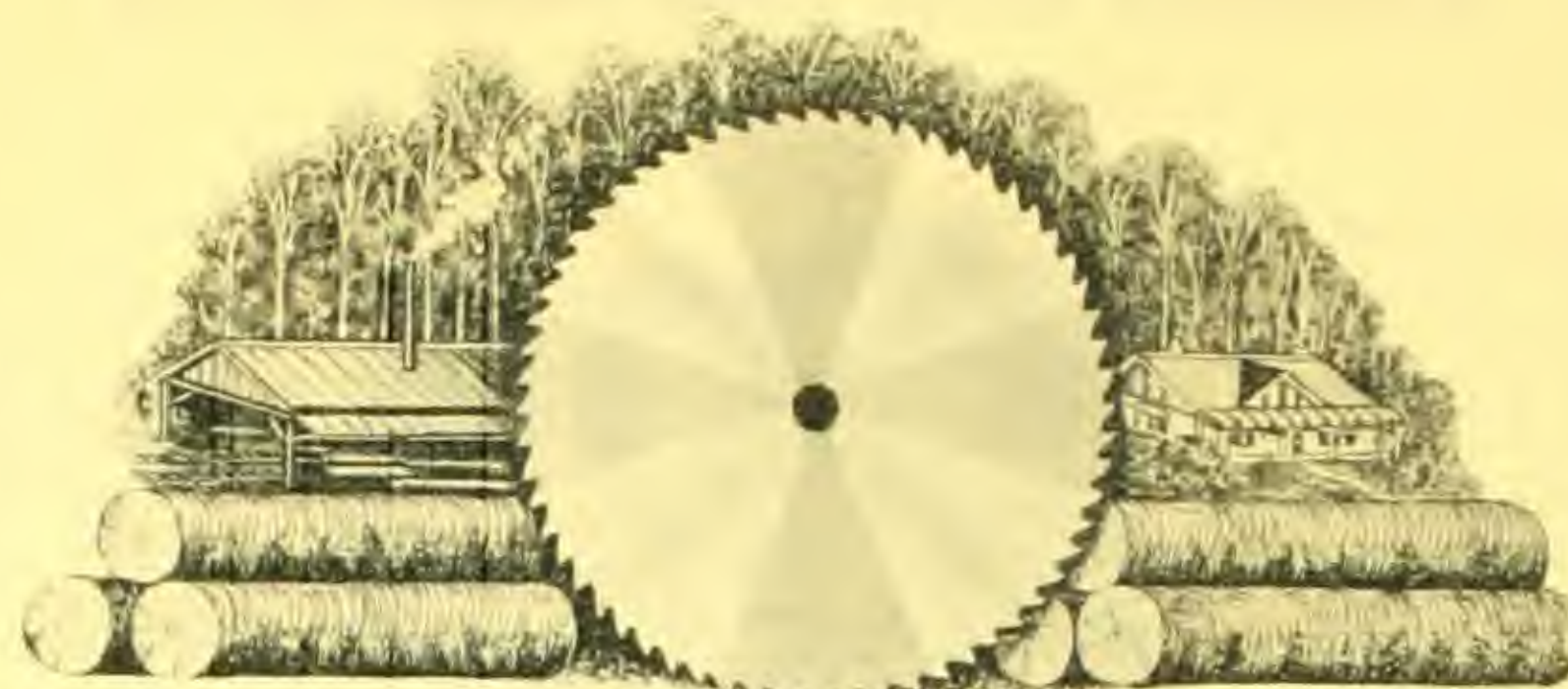
19a

S.A.A. File No.

**A**  
**Complete**  
**Service**  
**Offered--**  
**North,**  
**South or**  
**West**

## The Association

Has been in existence for over 25 years, and now has a membership roll covering 120 mills throughout the State; these mills convert every variety of the numerous species of native timber. Central office is in Sydney, and branches are established at Grafton and Lismore, while many groups and sub-branches exist in the inland districts, where Cypress Pine is the principal timber available.



## Service to Architects

Sawmillers and merchants of this Association are at all times ready and anxious to co-operate with the Architect, by way of information or assistance, as to the class

and quantity of timber available, and as to any special features of the local trade. Climatic conditions within the State vary greatly with elevation and with distance from the sea-coast; and from this it follows that the degree of humidity will directly affect the factor of moisture content of the timber to be used.

A moisture content of (say) 12 per cent. on the sea-coast, which is about normal, would not be suitable for inland districts, where humidity is low, and moisture content more like 8 per cent.

In these and similar matters which are of purely local knowledge, all possible co-operation and assistance from the sawmiller is readily granted.

## AUSTRALIAN TIMBERS

Are known the world over for their great strength and durability, and general resistance to dry rot, pests and decay. They are unsurpassed for use in their native conditions, whether in dry or humid districts, and for this reason alone are to be preferred to any imported timbers, which are not so adaptable.

## Advantages

The advantages of adopting the native article are mainly those of convenience, economy, durability and service; when any special sizes or unusual patterns are required, local mills and yards are equipped and ready to meet the demand.

Whilst standardisation in sizes and patterns is almost universally adopted, the desires of the Architect for more efficient or artistic finish are received and considered with every attention.

## Range of N.S.W. Timbers

Early colonists found, in the coastal belt, numerous timbered areas capable of supplying all requirements for structural and embellishment purposes. Further inland, where hardwoods were not so plentiful, the availability and the structural qualities of Cypress Pine were found to be of great service in all classes of building work. In short, wherever colonisation was effected, man's building timbers were found to be at hand.

Because of the existence of local sawmills in every country town in the coastal belt and inland distribution depôts and yards which are able to cope with all normal requirements, native timbers of all descriptions are now always available, in quantity and quality to suit all needs, within easy reach throughout the State.

The more important timbers of N.S.W. have been roughly classified as set out in the following tables, which indicate the wide variety available. On the following page a list of recommended applications of some of these timbers is shown.

### A.—HARDWOODS.

- |                    |                     |
|--------------------|---------------------|
| 1. Ironbarks       | (f) Grey Box        |
| 2. Stringybarks    | (g) Brush Box       |
| 3. Pale Hardwoods  | 4. Red Hardwoods    |
| (a) Mountain Ash   | (a) Red Mahogany    |
| (b) Blackbutt      | (b) Grey Gum        |
| (c) White Mahogany | (c) Murray Red Gum  |
| (d) Tallow-wood    | (d) Forest Red Gum  |
| (e) Spotted Gum    | (e) Sydney Blue Gum |
|                    | (f) Turpentine      |

### B.—FIGURED AND SOFTWOODS.

- |                           |                             |
|---------------------------|-----------------------------|
| 1. Cedar and Beech        | 4. Blackwood, Etc.          |
| (a) Red Cedar             | (a) Black Bean              |
| (b) Rosewood              | (b) Blackwood               |
| (c) Red Bean              | (c) Myall                   |
| (d) Onion Wood            | 5. Miscellaneous Brushwoods |
| (e) Beech                 | (a) Native Teak             |
| 2. Pines                  | (Flindersia)                |
| (a) Colonial or Hoop Pine | (b) Cudgerie                |
| (b) Cypress Pine          | (c) Blueberry Ash           |
| 3. Oaks                   | (d) Red Ash                 |
| (a) Red Silky Oak         | (e) Maiden's Blush          |
| (b) Silky Oak             | (f) Bolly Gum               |
| (c) She-Oak               | (g) Coachwood               |
| (d) Honeysuckle           | (h) Yellowwood or Long Jack |
|                           | (i) Sassafras               |

(Continued on next page.)



## FEATURES OF NEW SOUTH WALES HARDWOODS

## General

Scientists, after the fullest investigation, describe the Native Hardwoods as possessing all the qualities of grain, colour, texture, weight and durability to replace any exotic timber. The Eucalypt family is estimated to cover at least two-thirds of the timbered area of the Commonwealth.

## Strength

Section for section, our Hardwoods stand alone, in all strength tests applied by experts and scientists. It follows that building practice allows smaller sections to be used, while security is retained. The economy of this is obvious. Not alone in Hardwoods is this quality to be found. Hoop Pine is stronger, section for section, in transverse strength, than imported Douglas Fir, and many of the scrub timbers, comparatively little known, have special qualities of strength which bring them into favour amongst users, against even the well-known hardwoods.

Proof of the capacity of Hardwoods is shown in scientific tests applied. All the recognised hardwoods in general use show a breaking strain running from 6,000 lbs. to over 9,000 lbs. in a section 3 ins. x 3 ins. at 38-in.

centres, and this is coupled with a density showing weights from 58 to 65 lbs. per cubic foot.

## Durability

There are no timbers in the world to compare with New South Wales Hardwoods for strength and durability. Instances can be quoted freely of timbers, put into use by the early colonists, being in perfect condition after long periods; some of the early homesteads for over a hundred years. In many cases there has been no attempt to preserve such materials by means of paint or preservative of any kind. Heavy construction, such as bridges and various forms of railway construction, wharves and jetties, all exposed to the severest climatic conditions, give clear proof, wherever examined, of the long life and resistance to decay, of these timbers.

## Resistance

Decay and dry rot are slow in taking effect upon native timbers, and with proper attention to painting there is no limit to the life of the structure. Most of the hardwoods contain properties which act as preservatives, for example, Tallowwood carries an essential oil which remains in the timber indefinitely, and is found in timber re-cut after a score of years.

## RECOMMENDED APPLICATIONS OF NEW SOUTH WALES TIMBERS

## Suitability

As already stated, there are timbers available for every need of the Architect, but special knowledge of these factors should be sought. As an illustration, Ironbark, while being almost everlasting, so far as durability and hardness are concerned, would not necessarily be chosen for flooring purposes, when a less hard timber, which would be more readily worked and handled, would suit equally well. Similarly, with handrail timbers, it is not necessary to specify the hardest and most difficult of treatment.

The following table shows a list of the wide variety of timbers suitable for structural purposes and interior

embellishment. Selection of these would depend on the conditions and requirements as noted above and in the following paragraph on Requirements for Ordering and Specifying.

## Requirements for Ordering and Specifying

It is desirable in most cases before specifying or ordering native timbers, to enquire as to, and if possible inspect, the stocks of such timbers available. Not every timber is suitable for special conditions or treatment; and while it may be said that broadly, the local timber is adapted for local use, there are certain positions in a building for which particular timbers are more desirable than others. On this matter the special knowledge gained by the sawmiller or local builder is of service.

When ordering, specify where possible the purpose for which the timber is intended, and its position in the building; whether to be in contact with the ground or otherwise; whether decorative figure is required, etc.

Give choice of lengths; for example, floor joints allow breaks on certain bearers and plates. Alternative lengths will help to expedite delivery, and while little trouble to the buyer, is a convenience to the miller.

When random lengths or running measurement will suffice, order in that way; special lengths are not always necessary.

Flooring which is not to be polished or left uncovered need not be spotless on all sides; limited defects in appearance will not be detrimental. Strength and reliability of service are the essentials, and all native timbers possess these. For whatever purpose the timber is required, a grade will be found to suit.

## Grading

Every care is taken to ensure that all timber is marketed true to grade, and the classifications adopted are almost universal. Good work is still being done, in conjunction with the Standards Association of Australia, to thoroughly co-ordinate the methods and systems which have in some instances followed different ways, and it is expected that at a very early date this agreement will be not only State, but Australia wide.

Application or Use.	Recommended Sizes.	Recommended Timbers.
Ground Plates and Bearers	4, 5, or 6 in. x 3 in.	General Hardwoods, including Grey Gum, White Mahogany, Woollybutt, Blackbutt, Tallowwood, Stringybark, Spotted Gum, Blue and Red Gum, and Ironbark.
Top Plates	3 or 4 in. x 3 in.	
Floor Joists	1 or 5 in. x 2 in.	
Studs		
Ceiling Joists	3 or 4 in. x 2 in.	
Rafters		
Collar Ties and Trimmers		
Battens	3 x 1 in. or 3 x 1 1/2 in.	Hoop Pine, Blackbutt, Blue Gum, and the lighter hardwoods.
External Flooring	3 and 4 in. wide x 1 in. to 1 1/2 in. thick.	Tallowwood, Mahogany (red and white), Spotted Gum, Blue Gum, Ironbark, etc.
Internal Flooring	3, 4, and 4 1/2 in. wide x 1 in. to 1 1/2 in. thick.	Hoop Pine, Cypress Pine, Beech, Teak, Cudgerie, and the lighter hardwoods.
Weatherboards and Chamfers—plain or feather-edge	6 and 7 in. x 1 in.	General Hardwoods, including Red and White Mahogany, Tallowwood, Blue Gum, Spotted Gum, Ironbark, etc.
Linings, Ceilings and Partitions	2 in. to 1 in. in thickness, by various widths; patterns standard or special.	Hoop Pine, Yellowwood, Bolly Gum, Cudgerie, Red and White Mahogany, Spotted Gum, Red or Blue Gum, Blackbutt.
Internal Furnishings, Panelling, etc.	Various sizes for Mouldings, Panels, etc.	Hoop Pine, Rosewood, Red Bean, Yellowwood, Bolly Gum, Cudgerie, Beech, Red Mahogany, Sassafras, Silky Oak, Cedar, Coachwood, Blue Fig, and the lighter coloured hardwoods.



<p>19a</p> <p>S.A.A. File No.</p>	<p align="center"><b>THE HARDWOOD MILLERS' ASSOCIATION</b> OF VICTORIA</p> <p align="center"><b>312 FLINDERS STREET, MELBOURNE</b></p> <p align="center">Telephone: Central 10666      Manager's Residence: W 5174</p>	<p align="center"><b>H M V</b></p>
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### WORK OF THE ASSOCIATION

The comparative little use of hardwoods in the past has been due, in many instances, to the admittedly unscientific manner of production in which the timber was cut, insufficiently seasoned and incorrectly graded; while on the other hand, when timber containing none of these defects was actually produced, the Architect or Builder was often in a state of ignorance concerning its correct use because of the absence of correct technical information, and the incomplete methods of classification adopted.

To remove the resultant stigma against hardwoods, The Hardwood Millers' Association of Victoria have applied science to their industry, and now stan-

dardise all the productions of their members, register a brand for each member, and foster proper grading, seasoning, classification and production.

Victorian Millers have thus led the way in progress and development, and are now able to give the Architect and Builder just what they require. This organisation is at the disposal of all who seek information; lists of registered brands may be obtained and every assistance will be given to those who seek our co-operation.

We do not assume any responsibility for unbranded timber or for brands other than those we register.

### VICTORIAN HARDWOODS

#### *Every Pound's Worth of Victorian Timber Used will make Victoria a Pound Better Off*

Herein we briefly set out some useful information for the guidance of Architects, Engineers, and Builders in the general use of Victorian hardwoods.

The principal marketable timbers produced are set out in the table of working stresses and can be produced in any required size in lengths up to 50 feet. No difficulty will be experienced in procuring large sizes in long lengths if orders are given in reasonable time.

Hardwood can be produced in any size for building construction, bridge construction, concrete formwork, scaffolding, fencing, etc. The various species of Victorian hardwood have their respective uses, and some are unequalled for use in or on the ground or water work. We will be pleased to recommend the most suitable.

#### Strength of Victorian Hardwoods

It is not generally recognised that in the hardwoods of Victoria there are some of the most remarkable timbers in the world from a strength standpoint. These are so strong for their weight, that they might be regarded as the optimum arrangement of wood substance, to give high strength properties without too great a density. That this has been overlooked, and that general use has not been made of the valuable structural properties of the timbers, have been due to the fact that strength data have not been available in a form suitable for the architect. To remedy this the following tables of working stresses for ordinary building construction have been prepared after a thorough investigation of all available strength data on these timbers.

For convenience the timbers have been divided into two groups, and while naturally the strengths vary somewhat in the species within a group, the figures given are safe for any of the timbers. This grouping will have an additional appeal to the architect, for appearance and conditions of supply of the timbers are such that while there might be misidentification of the timbers

within a group, there need be no fear of supply of timbers of the weaker group in mistake for those of the stronger, to the detriment of design.

#### Group A—

Mountain Ash (*E. regnans*).  
Red Ash or Woollybutt (*E. gigantea*).  
Messmate (*E. obliqua*).  
Silvertop (*E. sieberiana*).  
Brown Stringybark (*E. capitellata*).  
Red Gum (*E. Rostrata*).

#### Group B—

Blue Gum (*E. globulus*).  
Yellow Stringybark (*E. muelleriana*).  
White Stringybark (*E. eugenoides*).  
Mountain Grey Gum (*E. goniacalyx*).

#### Working Stresses for Victorian Hardwoods

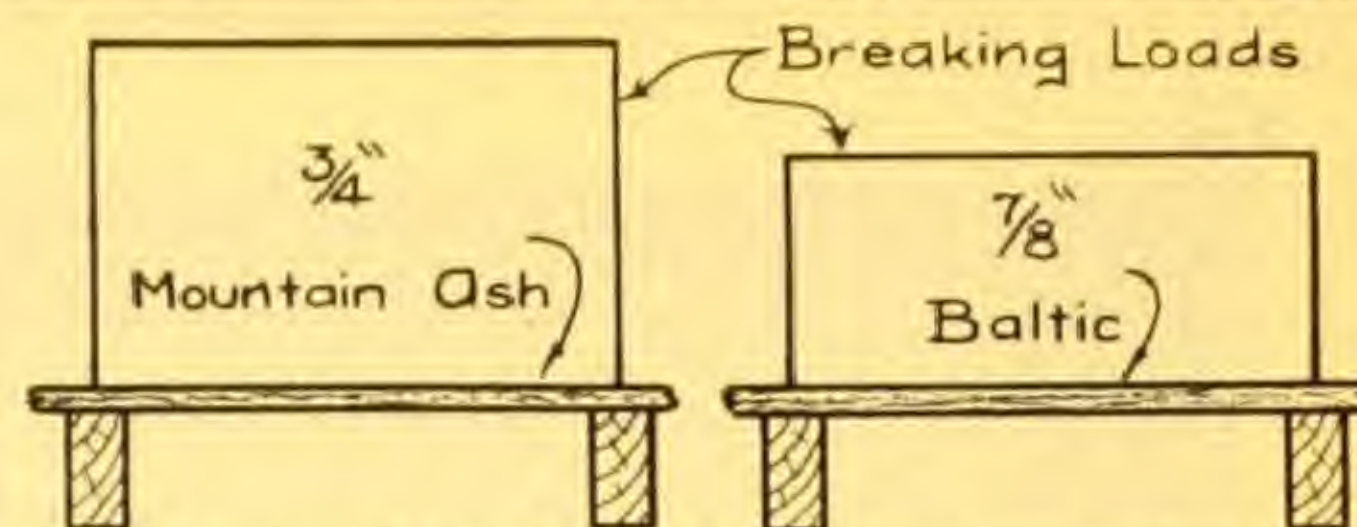
Type of Stress.	Group A.	Group B.
Bending	2,000 lbs./sq. in.	2,500 lbs./sq. in.
Struts—		
L — less than 10	1,200 lbs./sq. in.	1,500 lbs./sq. in.
D — 10 to 25	20L 1,400 — lbs./sq. in.	20L 1,700 — lbs./sq. in.
D	D	D
Bearing—		
Across grain	450 lbs./sq. in.	550 lbs./sq. in.
End grain	1,500 lbs./sq. in.	2,000 lbs./sq. in.
Shearing—		
Horizontal shear in beams	170 lbs./sq. in.	210 lbs./sq. in.
Shear in Joint Details	250 lbs./sq. in.	320 lbs./sq. in.
Tension	2,000 lbs./sq. in.	2,500 lbs./sq. in.
Modulus of Elasticity	2,000,000 lbs./sq. in.	2,500,000 lbs./sq. in.

(Continued on next page.)



The strength and stiffness of the Victorian hardwoods will permit the use of smaller sections of timber, so that the disability of greater weight can largely be avoided. An example of this is the fact that a  $\frac{3}{4}$  in. Mountain Ash floor has more than 50 per cent. greater strength than a  $\frac{7}{8}$  in. Baltic floor, and even exceeds the strength of a 1 in. Baltic floor. (See opposite diagram.)

Hardwood has nearly twice the breaking strain of Oregon; it is more resistant to insect destruction or fire, and has double the life.



Relative Strengths of  $\frac{3}{4}$  in. Mountain Ash and  $\frac{7}{8}$  in. Baltic Floor.

### KILN-SEASONED HARDWOOD: A RELIABLE PRODUCT

During the last few years there has been a steady increase in the adoption of kiln-seasoning by Victorian sawmillers, and the present output of which Victorian kiln-seasoning plants are capable is approximately 25,000,000 super feet per annum.

Not only has the number of seasoning plants increased, but there has been a sincere effort to improve existing practice. Old kilns have been modified, stacking has been improved, and regular testing of the finished product has, in many plants, supplanted the old method of judging the quality of the kiln-dried product by its appearance.

The consequent improvement in the attractiveness and quality of such lines as hardwood flooring, lining, joinery and furniture stocks is marked.

### Reconditioning Warped Timber

One of the biggest factors contributing to this improvement has been the widespread adoption of a treatment for reconditioning collapsed and warped timber. Discovered and developed in Victoria in the first instance, this treatment has such tremendous advantages that it has attracted world-wide interest. It has been used in the U.S.A.; its application to certain English timbers is being investigated in England, and it is now being adopted throughout the Commonwealth of Australia. It is carried out as an adjunct to kiln-seasoning, and consists of a final steaming treatment, during which warped boards straighten and boards exhibiting uneven shrinkage, commonly known as collapse, regain a full and regular shape. The changes produced are permanent, and not only is the resultant product much more useful and attractive, but the timber becomes much easier to work, while not being reduced

in strength. Further, timber which has been reconditioned does not shrink or swell with changing climate conditions to the same extent as does timber which has not been reconditioned.

### Reliability

The net result of this progress in the seasoning and reconditioning of Victorian hardwoods is that it is now possible for the architect or builder to obtain supplies of timber on which he can rely absolutely, and which in appearance and utility is unsurpassed.

All the kiln-dried productions of our members are branded with the registered trade mark or brand of the individual member in addition to the Association's brand "H.M.V." The latter will signify that the production is properly standardised in size, machining, quality, and seasoned to the correct formula. Hence, all lines bearing the additional brand "H.M.V." will match and compare in every detail and carry the thorough recommendation of the Association.

### Standard Sizes of Kiln-Dried Hardwood

#### Productions

Flooring, selected quality— $3\frac{1}{4}$  x  $\frac{1}{2}$ ;  $3\frac{1}{4}$  x  $\frac{3}{4}$ .

Flooring, selected quality— $4\frac{1}{4}$  x  $\frac{1}{2}$ ;  $4\frac{1}{4}$  x  $\frac{3}{4}$ .

Flooring, merchantable quality— $5\frac{1}{4}$  x  $\frac{1}{2}$ .

(in place of Baltic)

Lining, selected quality— $3\frac{1}{4}$  x  $\frac{1}{2}$ ;  $4\frac{1}{4}$  x  $\frac{1}{2}$ ;  $5\frac{1}{4}$  x  $\frac{1}{2}$ .

Lining, merchantable quality— $3\frac{1}{4}$  x  $\frac{1}{2}$ ;  $4\frac{1}{4}$  x  $\frac{1}{2}$ ;  $5\frac{1}{4}$  x  $\frac{1}{2}$ .

Weatherboards— $6\frac{1}{2}$  in., round edge or bank pattern.

Architraves, Skirtings, Mouldings, etc., in trade patterns and sizes.

All kiln-dried timbers are cut on the quarter from sound matured logs.

### ARCHITECT'S SPECIFICATION FOR HARDWOOD-FRAMED DWELLING

NOTE.—Only the more important items have been included. GENERAL.

All timber shall be the best of its respective kinds, properly seasoned and free from large, loose and dead knots, shakes and sap, and to be of the full size specified. Exposed timbers shall be properly dressed for painting.

#### SOLE PLATES AND STUMPS.

Sole Plates and Stumps shall be red gum, and obtained from the mills of a member of the Hardwood Millers' Association of Victoria.

Sole plates,  $9 \times 9 \times 1\frac{1}{2}$  in. (or  $9 \times 6 \times 1\frac{1}{2}$  in.). Stumps,  $4 \times 4$  in., spaced at 4 ft. centres.

FRAMING TIMBERS.—All framing timbers, joists, studs, rafters, purlins, braces, etc., shall be ..... (state kind of hardwood desired) obtained from the mills of a member of the Hardwood Millers' Association of Victoria. Sizes and construction shall be as follows:—

FLOOR FRAMING.—Plates and bearers,  $4 \times 3$  in. on edge, spaced at 4 ft. (or not more than 6 ft.) centres. Floor joists,  $4 \times 2$  in., spaced at 18 in. centres. Plates and bearers in long lengths scarfed jointed at corners and joints.

WALL FRAMING.—Vermin and top plates,  $4 \times 2$  in. Studs,  $4 \times 2$  in. (or  $4 \times 1\frac{1}{2}$  in.) spaced at 18 in. centres, checked  $\frac{1}{2}$  in. into plates, and braced with  $3 \times 1$  in. diagonal bracing let into studs. Corner and door studs,  $4 \times 3$  in. (or  $4 \times 2$  in.). Heads to openings up to 4 ft. wide,  $4 \times 2$  in.; over 4 ft. wide,  $6 \times 2$  in. on edge.

CEILING FRAMING.—Ceiling joists,  $4 \times 2$  in. (or  $4 \times 1\frac{1}{2}$  in.). Hanging beams,  $10 \times 2$  in. (or  $9 \times 1\frac{1}{2}$  in.) spaced at 6 ft. centres. Joists hung to hanging beams with  $2 \times 2$  in. (or  $1\frac{1}{2} \times 1\frac{1}{2}$  in.) fillets.

ROOF FRAMING.—Rafters for tile roofs,  $5 \times 1\frac{1}{2}$  in. (or  $4 \times 2$  in.) spaced at 18 in. centres; for iron roofs,  $4 \times 2$  in. (or  $4 \times 1\frac{1}{2}$  in.) spaced at 3 ft. centres. Rafters cut plumb at ridge, notched at plates and nailed to sides of joists.

Purlins,  $4 \times 3$  in.—two rows to be provided when rafters exceed 20 ft. in length. Struts and braces,  $4 \times 3$  in. (or  $4 \times$

2 in.). Collar ties,  $4 \times 2$  in. (or  $4 \times 1\frac{1}{2}$  in.) to each alternate pair of rafters.

Ridge, hips and valleys,  $9 \times 1\frac{1}{2}$  in. (or  $8 \times 1\frac{1}{2}$  in.). Valley boards, 1 in. thick. Battens for tiles,  $2 \times 1$  in.; for iron,  $3 \times 1\frac{1}{2}$  in.

Barge boards,  $9 \times 1\frac{1}{2}$  in., with ..... in. bed moulds under tiles.

BASE BOARDS.—Lining from floor to ground line,  $6 \times 1$  in. hardwood; top board chamfered and dressed.

EAVES SOFFIT.—Overhanging rafters shall be back-lined with  $5\frac{1}{4}$  x  $\frac{1}{2}$  in. T. & G. merchantable quality ..... brand kiln-dried hardwood, bearing the miller's brand and the initials "H.M.V." Bird board of  $6 \times 1$  in. hardwood, cut in between rafters.

Gable soffit to be similarly lined, and have ..... in. mould at intersections.

#### FLOORING, LINING AND WEATHERBOARDS.

HARDWOOD FLOORING.—The flooring to the following rooms shall consist of (a)  $3\frac{1}{4}$  x  $\frac{1}{2}$  in.—(b)  $3\frac{1}{4}$  x  $\frac{3}{4}$  in.—(c)  $4\frac{1}{4}$  x  $\frac{1}{2}$  in.—(d)  $4\frac{1}{4}$  x  $\frac{3}{4}$  in.—T. & G. selected quality (or  $5\frac{1}{4}$  x  $\frac{1}{2}$  in. T. & G. merchantable quality) ..... brand kiln-dried hardwood, bearing the miller's brand and the initials "H.M.V."

NOTE.—State location of flooring.

Flooring shall be well cramped up and double-nailed at each bearing.

LININGS.—Linings to the following compartments, rooms, etc., shall consist of (a)  $3\frac{1}{4}$  x  $\frac{1}{2}$  in.—(b)  $4\frac{1}{4}$  x  $\frac{1}{2}$  in.—(c)  $5\frac{1}{4}$  x  $\frac{1}{2}$  in.—T. & G. V-jointed selected quality (or merchantable quality) ..... brand kiln-dried hardwood, bearing the miller's brand and the initials "H.M.V."

NOTE.—State location of compartments, etc., that are to be lined.

WEATHERBOARDS.—All weatherboards shall be  $6\frac{1}{2}$  in. round edge ..... brand kiln-dried hardwood, bearing the miller's brand and the initials "H.M.V."

Weatherboards shall be securely punched, nailed to studs, lapped  $1\frac{1}{2}$  in., and butted to  $2 \times 1$  in. corner stops.



# CUMING, SMITH & Co. PTY. LTD.

HEAD OFFICE:

65 WILLIAM STREET, MELBOURNE, C.1

SEASONING WORKS: WARBURTON, VICTORIA

SICKLE  
BRAND

19d

S.A.A. File No.

## Products

Kiln-dried "Sickle" Brand Mountain Ash Hardwood Floorings, Weatherboards, Linings and Mouldings. "Sickle" Brand Wood-Block and Parquetry Flooring.

## Where "Sickle" Brand Timber Products are Grown

Some of the finest stands of Mountain Ash are grown in the immense State Forest area near and beyond Warburton, some 50 miles from Melbourne.

The Hardwood Timber Seasoning Works of Cuming, Smith & Co. Pty. Ltd., are situated on the Woods Point Road, adjacent to the Yarra River, about three miles from Warburton, in the heart of this forest area.

## Seasoning—Kiln Drying

The Company's Hardwood sawmills are sawing timber from logs that have just been cut from the growing forest. Containing a very large percentage of moisture, as much as 50 per cent., timber in such a condition is unsuitable for manufacturing purposes, and before it can be used for any class of work where some degree of finish is required, it must be in good condition and perfectly dry.

There are two methods of seasoning timber, one is by stacking the timber for a lengthy period, to allow it to dry; this is what is called air drying or natural seasoning. The other is artificial or kiln-drying. The air drying takes a long time, and in many cases the boards twist, crack, and invariably shrink to such an extent that the waste is very great. Another drawback to this method is that the centre of a stack usually contains a larger percentage of moisture than the outside, and, moreover, individual boards are drier or "case-hardened" at their outside surfaces than inside. The result is that there is no uniformity in the dryness of timber treated in this way.

But if a correct method of artificial or kiln-drying is adopted, the timber, when dry, is not only uniform in the moisture contents, but is about the same size as when sawn. Excessive

loss in size by shrinkage is eliminated. For these reasons kiln-drying is now used to a much greater extent than in the past, to bring the timber to the desired condition, and this can be done in a few weeks or months, according to the method adopted and the condition and size of the timber. The most successful method is to take the hardwood boards as they come from the mill, cut to the required sizes. They are stacked on edge on the kiln trucks with cross sticks between each row of boards, to form a passage for the free circulation of air, and are then left to stand out in the open for some weeks. During this time the air has reduced the moisture content to a very great extent, bringing the timber to the right condition for kiln drying.

The drying kiln is a large airtight chamber that will hold a truck loaded with several thousand feet of timber. As the cold air enters at the bottom, it passes over a series of pipes that are heated with steam. The air, thus warmed, circulates through the truck of boards, and having taken up a certain amount of moisture from the timber, passes out through the vents at the top. When the desired condition is reached, the treatment is completed, and the truck of boards is removed from the kiln uniformly dry throughout the stack.

This system, which is known as the moist air method, has given the best results in drying our hardwoods, because the timber is kept in a moist, humid atmosphere, which prevents checking, twisting, and also excessive shrinkage, which is the most difficult problem to overcome when drying hardwood. (See illustration on opposite page for example of excessive shrinkage of air-dried timber.)

When the timber is treated and dry, it is mild and retains a clean smooth finish, is light to handle, and it is absolutely free from case-hardening, is easy to work, and soft to nail.

## Identification of Brand

Every piece of first-grade flooring-board, weatherboard, lining, etc., produced by Cuming, Smith & Co. Pty. Ltd., is marked with the "Sickle" Brand, and the architect can confidently specify this brand, knowing that it has been thoroughly seasoned, smoothly milled to standard sizes after correct kiln drying, and carefully handled through the entire manufacture and transporting operations.



Mountain Ash  
Hardwood Stacks  
at the  
Seasoning Works of  
Cuming, Smith & Co.  
Pty. Ltd.,  
Warburton.

Head Office:  
65 William Street,  
Melbourne.  
(G.P.O. Box 390)

These ample stocks  
are portion of over  
1,500,000 super. ft. of  
Victorian Mountain Ash  
Hardwood for  
"Sickle" Brand  
Floorings, Linings,  
Weatherboards,  
Furniture Boards, etc.

(Continued on next page)



## Flooring

"Sickle" Brand Mountain Ash Hardwood Floorings are dressed from quarter-sawn boards, and do not buckle or shrink, and will not split when nailed—they have all the features that the Architect and Builder have a right to demand. (See also reference to Parquetry and Block Flooring, following.)

### GRADES

Special Selected—No. 1 Grade—No. 2 Grade, or Merchantable.

Special Selected—Dressed from quarter-sawn boards, one clean face, free from all defects, and to conform to standard dimensions. Lengths, six feet and upwards.

No. 1 Grade—Dressed from quarter-sawn boards, and may occasionally contain gum threads on the face of the board not exceeding 1/16th in. wide and one-sixth of the total length of the board, free of all other defects, and conforming to standard dimensions. Lengths, six feet and upwards.

No. 2 Grade—Dressed from sound, marketable boards, free of gum pockets, large or loose knots, wane, sapwood, grub and pinholes, and conforming to standard dimensions. Lengths, six feet and upwards.

### SIZES

3½ in. x ¾ in., 4½ in. x ¾ in., 5½ in. x ¾ in., all T. and G.

Cuming, Smith & Co. Pty. Ltd. also supply a large proportion of Melbourne's requirements in parquetry and block flooring, about which enquiries are welcomed, and information supplied.

### RECOMMENDATIONS

Special Selected makes the most durable and desirable floor and is particularly suitable for fine homes, apartments, dance floors, etc. Use 3½ in. x ¾ in.

No. 1 Grade is nearly as suitable as Special Selected and can be used in the same type of building. Any slight imperfection, such as gum threads, are not noticeable when stained the customary blackwood or walnut colour. Use 3½ in. x ¾ in., or 4½ in. x ¾ in.

No. 2 Grade, or Merchantable, gives excellent satisfaction in factories, mills, warehouses, etc.; being kiln-dried, there is no danger of shrinkage. Use 4½ in. x ¾ in., or 5½ in. x ¾ in.

## Linings

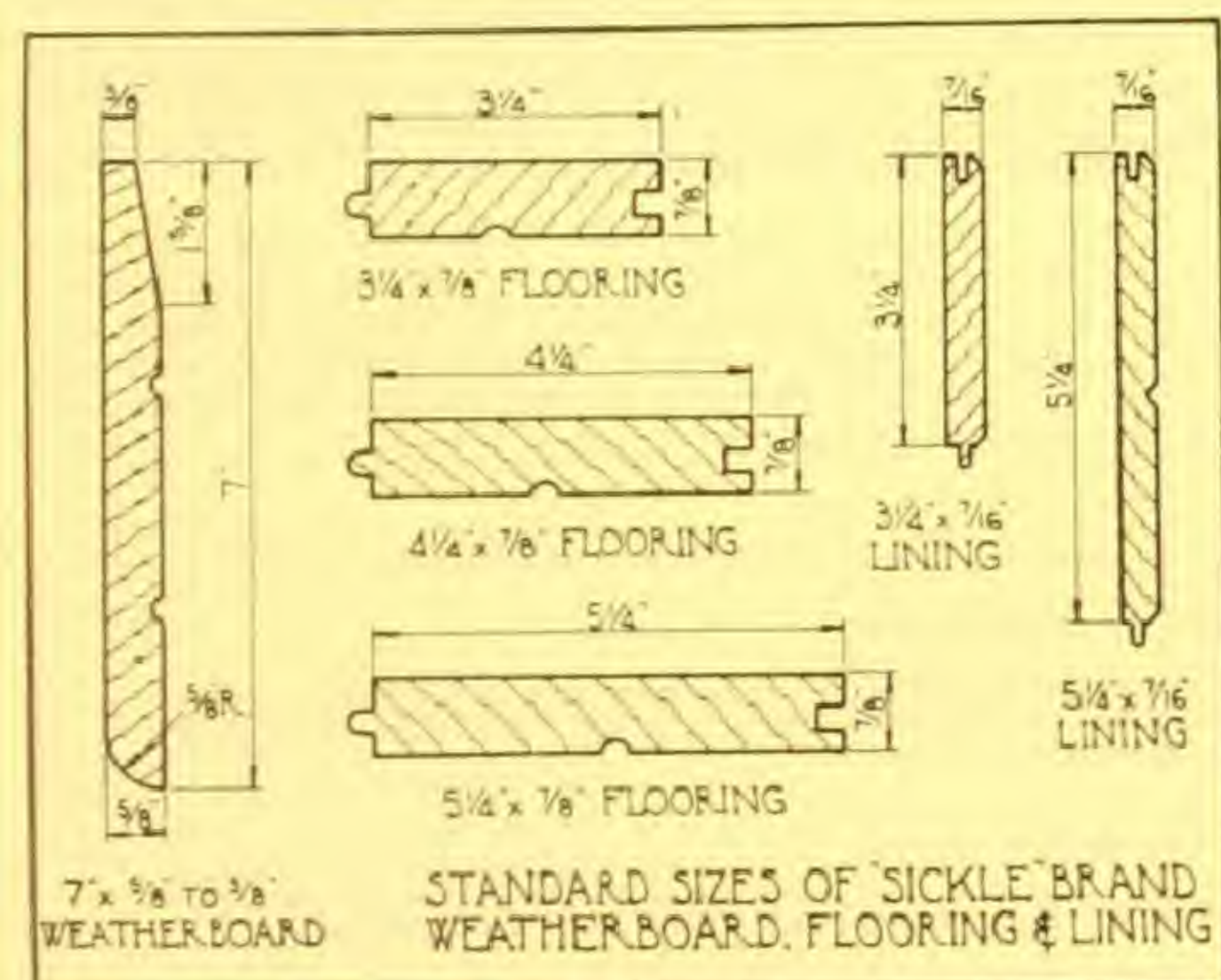
The same kind of selected Mountain Ash is used in the manufacture of linings as for floorings. All lining boards are carefully milled with V-joints, the 5½ in. having an additional V.

### GRADES

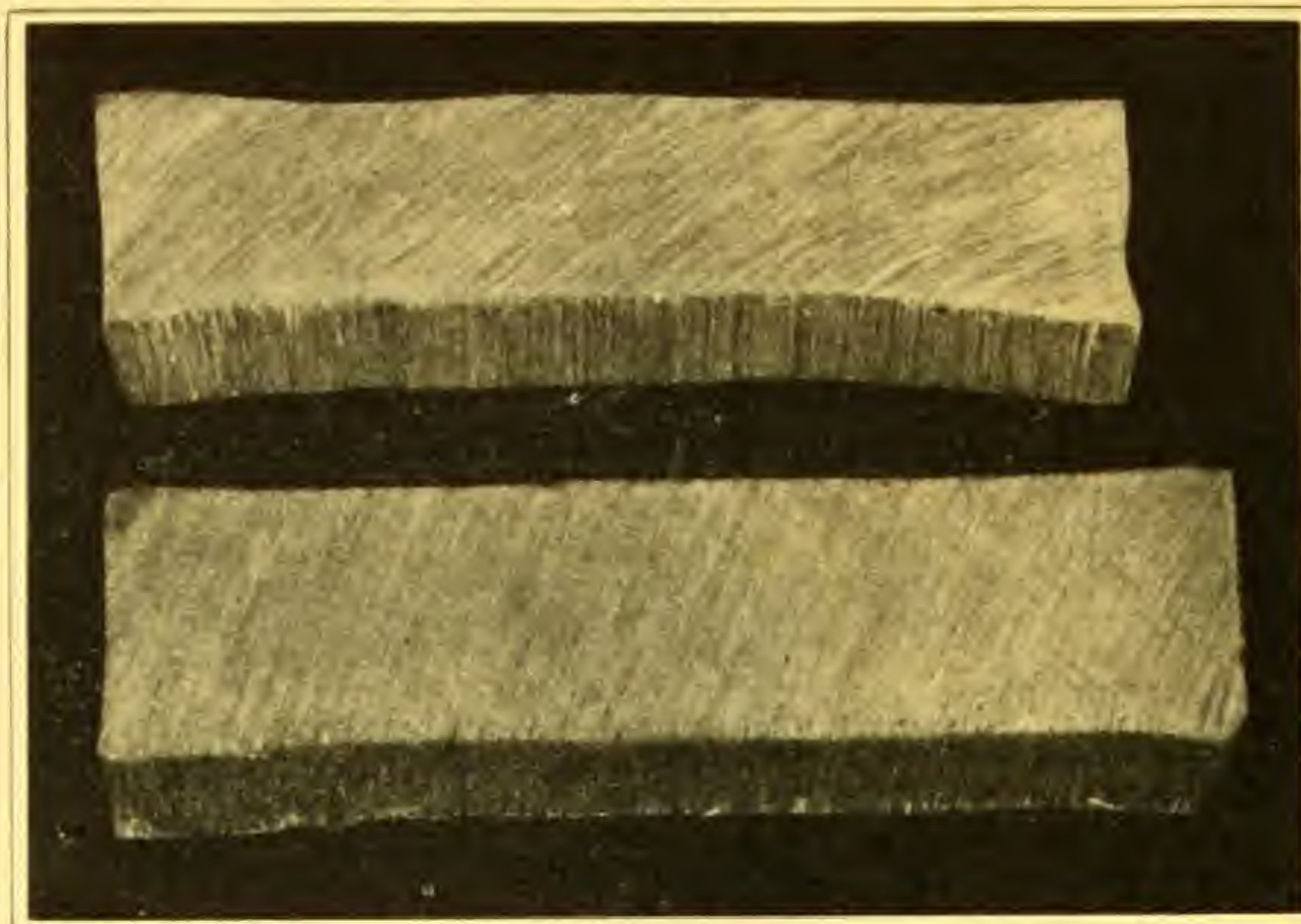
Same as for flooring, except that there is no "Special Selected."

### SIZES

3½ in. x 7/16 in., 5½ in. x 7/16 in., all T. G. and V-jointed.



(Drawn by the Architectural Staff of Ramsay's Catalogue)



Two pieces of Hardwood from the same plank. Note excessive shrinkage of the Air-Dried Timber at top, compared with the lower piece correctly Kiln-Dried.

### RECOMMENDATION

In general, should be used in conjunction with the recommendation for flooring boards. The natural beauty of the Mountain Ash hardwood when given a wax or varnish finish makes it suitable for use for cupboards and partitions in any room or a fine dwelling. It is particularly suitable for lining churches, halls, and offices. The "Merchantable" grade in any of the sizes specified is in every way superior to imported knotty pine woods.

## Weatherboards

"Sickle" Brand Hardwood Weatherboards are adaptable to practically every type and style of building from the small cottage to large residence; when suitably stained, a highly pleasing and permanent effect is produced.

### GRADES

No. 1 Grade; No. 2 Grade, or Merchantable.

### SIZE

7 in. x ¾ in. to ¾ in. finished size, round edge.

### RECOMMENDATIONS

No. 1 Grade, which represents first quality in "Sickle" Brand Weatherboards, is most suitable for houses, and when stained the customary blackwood or walnut colour, any slight gum threads that may be in some of the boards are not noticeable. No. 2 Grade, or Merchantable, is quite suitable for outbuildings.

### OILING AND FINISHING

"Sickle" Brand Mountain Ash Hardwood boards may be finished by flat oil stains, mixed stains, special varnish or floor lacquers. An excellent and beautiful finish is obtainable by machine surfacing followed by oiling or waxing, staining, filling and polishing, thus enhancing the beauty of the natural grain.

## ARCHITECT'S SPECIFICATION

Flooring.—All hardwood flooring in (state location) shall be 3½ in. x ¾ in. T. & G. (or 4½ in. x ¾ in.) Special Selected (or 1st Grade) "Sickle" Brand Kiln-Dried Mountain Ash Hardwood laid as follows.....

Lining.—All linings to..... shall be 3½ in. x 7/16 in. T.G., V-jointed (or 5½ in. x 7/16 in.) 1st Grade (or Merchantable) "Sickle" Brand Kiln-Dried Mountain Ash Hardwood, fixed as follows.....

Weatherboard.—All weatherboard to..... shall be 7 in. x ¾ in. to ¾ in. 1st Grade (or 2nd Grade) "Sickle Brand Mountain Ash Hardwood, fixed as follows:.....



**BROOKS, ROBINSON & CO. LTD.**

ELIZABETH STREET, MELBOURNE

WORKS: MAFFRA STREET, SOUTH MELBOURNE

Telephone M 3131 (5 lines)

19c

S.A.A. File No.

B-R

[For Other Products, See Pages 70, 96, 141, 236 and 468]

**ARCHITECTURAL WOODWORK****Interior Woodwork**

Brooks, Robinson & Co. Ltd. specialise in the best class of interior Woodwork, which comprises high-class joinery and panelling.

Stocks of fully seasoned Australian Timbers enable them to fulfil many contracts successfully. Probably there are no more beautiful timbers in the world than the Australian Hardwoods and figured timbers, but unless they are thoroughly and scientifically seasoned they are useless for high-class joinery work.

Designs which Brooks, Robinson & Co. Ltd. have executed in the past varied considerably from the modern adaption of the staid Jacobean, Elizabethan, with enriched molds and carving to the modern and ultra-modern with absolutely flush surfaces.



Maple Panelling and Parquetry Flooring.  
H. A. Norris, Architect.

**Panelling**

In modern and ultra-modern panelling designs, the absence of moldings is compensated for by the use of veneers, contrasting woods, direction of graining and special inlays.

These panels of flush work may be obtained in width from 4 ft. up to 6 ft. without joints; being made up of plywood and covered with thin veneers. Because of this construction, the chance of warping and shrinking are negligible.

Finish of panelling depends on the decorative scheme, and the number of finishes is practically unlimited, ranging from dull finishes to modern, highly-polished glass surfaces, although modern work allows of much latitude.

**PARQUETRY FLOORING****Advantages**

Parquetry flooring is advantageous in that it is fire-proof, being absolutely airtight; silent to the tread; it saves floor height by dispensing with beams and joists; it gives appearance, extreme durability, warmth and hygiene. All flooring laid by us is of selected stocks, perfectly seasoned, scientifically dried, manufactured with precision; and infinite care is used in laying and finishing.

**Sizes**

Consisting of tongued and grooved blocks so designed as to interlock at both sides and ends, to ensure a perfectly level floor, Parquetry Flooring is made in a standard size of 12½ in. x 2½ in. x 13-16th in. for buildings with cement floors. In residences, the usual block is ¾-in. thick and is secretly nailed to existing wood floors.

**Materials Used and Finish**

Timbers generally used are Kiln-dried Victorian Ash or Tasmanian Hardwood, Jarrah, Blackwood and Imported Oak. Other timbers can also be supplied. This type of floor may be laid in a great variety of designs, and has an exquisite finish, as after laying the surface is electrically sanded, filled and wax polished.

**Preparation of Sub-Base**

In concrete buildings, the blocks are set with a special bituminous cement (heated to a correct temperature) direct on to the screeded surface. In other buildings, the under floor is properly dried, then a specially prepared binder coat is first applied, on which the blocks are set in the heated mastic.

**ARCHITECT'S SPECIFICATION****MATERIALS.**

All flooring to ..... (state location) shall be of Premier Wood Block, 13-16th in. thick, tongued and grooved ..... (state timber), all kiln-dried.

**WORKMANSHIP.**

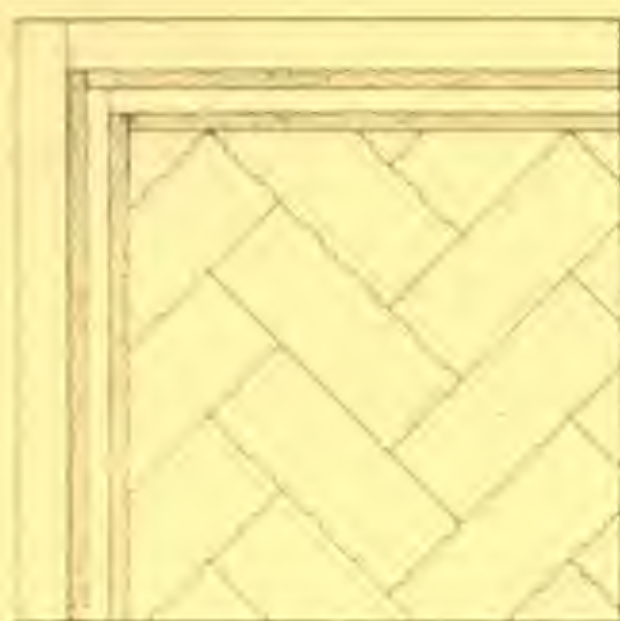
Lay on properly dried, screeded concrete floor (or

wooden underfloor) in a heated Premier mastic binder coat to the selected design (securely nailed to wooden underfloor).

**FINISHING.**

After other trades have completed their work, the floor shall be machine sanded, filled and wax polished.





Design 1.

### Selection of Designs

Brooks, Robinson & Co. Ltd. realise the difficulty of selecting suitable designs from illustrations, diagrams or small panels of parquet flooring, and so have so arranged that they can show to architects and their clients a large range of actual samples in position and under traffic.



Chapel, Convent of Good Shepherd, Oakleigh, Victoria.



Design 2.

### Service to Architects

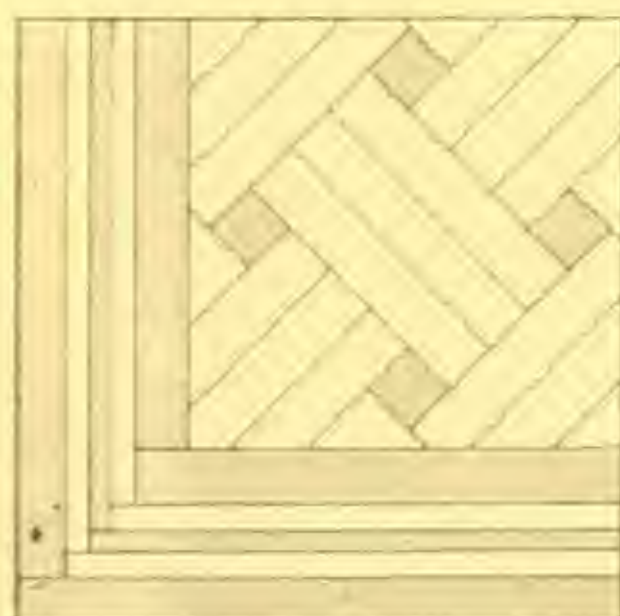
The Parquetry department of Brooks, Robinson & Co. Ltd. are at all times ready to advise on flooring problems on new or remodelling work, and will prepare estimates for complete installation, including preparation of sub-base, laying, finishing and polishing.



Chapter House, St. Paul's Cathedral, Melbourne.



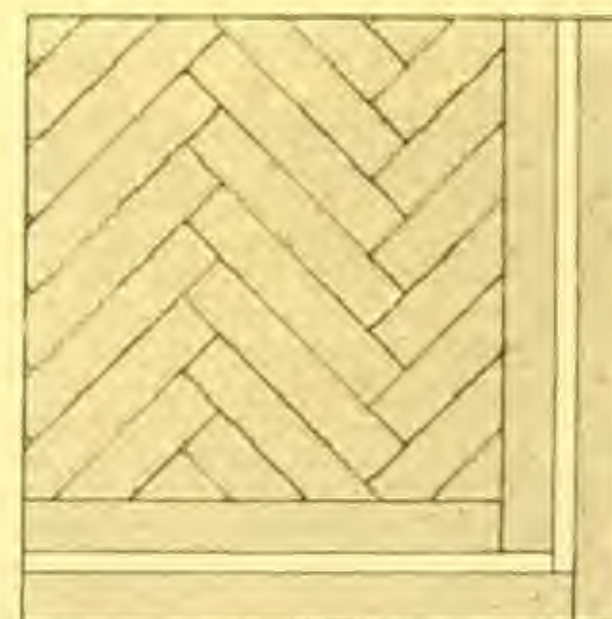
Lounge, Private House.



Design 3.

### SOME RECENT INSTALLATIONS.

A.M.P. Building, Melbourne.  
Architects: Bates, Smart & McCutcheon.  
Parliament House (New Wing), Melbourne.  
Architect: Public Works Department.  
Alciston House, Melbourne.  
Architects: A. & K. Henderson.  
Melbourne Town Hall.  
Architects: Stevenson & Meldrum.  
Bankers' and Traders' Insurance Co., Melbourne.  
Architects: Peck and Kemter.  
Convent of Good Shepherd, Chapel, Oakleigh.  
Architect: A. A. Fritsch.



Design 4.



# T. S. GILL & SON PTY. LTD.

672-684 CHAPEL STREET, SOUTH YARRA  
MELBOURNE

19e

S.A.A. File No.

ESTABLISHED 1892

GILL

PHONE: WINDSOR 8000

INTERIOR  
FITTINGS

[For Other Products, See Pages 147 and 238]

## Products

Interior Fittings for Stores, Banks, Offices, Hotels, Churches, Private Houses, and any kind of high-class Joinery Work.

## The Elements of Good Joinery Work

T. S. Gill & Son Pty. Ltd., having had long experience in the wide field of high-class joinery work for all types of buildings, offer the following remarks concerning the important elements necessary in the seasoning, panelling and polishing of Australian timbers. The best of the methods described are typical of their work, and can be accepted by the Architect as a basis of good workmanship in the production of the above products.

## Materials

The quality of the timber to be used is one of the main essentials to high-class joinery. The quality of various Australian timbers is most excellent, the drying or seasoning being of the greatest importance, and it is a wise precaution to see the actual timber proposed to be used before placing an order for first-class joinery. Many methods of drying timber artificially have been introduced, but the safest method up to date is to stack timber in the open air, with 1 in. battens, say, every 4 ft. apart, and the edges of the planks spaced 2 in. apart. Timber stacked in this way for a period of not less than two years may then be stacked under cover and is safe for use as required.

## Construction

All panelling should be framed, i.e., mortised and tenoned. All stiles and rails should be grooved to receive the panels, or solid rebated to receive glass. An alternative to this, and one commonly used, is to dowel the rails into the stiles, and "plant," i.e., nail on moulds or beads to receive panels or glass. This is obviously a much cheaper method than framing, but should only be permitted in work of a very cheap character.

## Polishing

The grain in many of our Australian timbers is so beautiful that it is worthy of the greatest care in polishing, by which means its beauty is enhanced.

## Method of French Polishing

All surfaces to be polished should be finished with a scraper and fine glass paper before being handed to the polisher. The first process should be that of "filling in" the open grain. This should be done with plaster of paris, which should be tinted to the colour of the desired finish. The plaster should be made quite wet and then applied with a rubber of hessian or any coarse material, and should be well rubbed in until all the open grain is perfectly filled up. The work should then be left until quite dry, and then washed off with raw linseed oil. All faces should be thoroughly rubbed down with very fine or worn glass paper.

The polish used should consist only of methylated spirits of wine and a first quality of shellac. This should be applied as a first or "bodying-up" coat, with a rubber made of cotton wool, contained in a clean cotton rag, the rubber being saturated with polish, having a moistening of raw linseed oil on the face of the rubber. The polish should be applied in this way until a slight polish is produced, in the meantime rubbing down with glass paper where any roughness appears. At this stage, the work should be stood aside for at least twenty-four hours, to allow the polish to sink into the wood. When commenced again, the whole surface should be thoroughly rubbed down with fine paper and raw oil and then wiped quite dry with a clean cotton rag. The finishing coat should be all as before, but gradually reducing the quantity of oil until the spirits have killed all the oil, which may be decided by rubbing the finger across the surface. Should a smear appear it is certain that a little oil still remains. When an even, bright surface is obtained, the final process is known as "spiriting off." This is done with a clean, new rubber, using spirits of wine only. This is carried in straight lines over the whole surface, resulting in a permanent highly-polished surface.

A much cheaper method, and one largely in use, is after the work has been filled in as set out above and oiled off, a coat of spirit varnish is applied with a brush, and, before the varnish is quite dry and hard, it is "stiffened out" with a polish rubber. This class of work will, in a very short time, show cracks all over the face, similar to those on the face of a glazed tile. Further, this work, unlike a genuine French polish, cannot be revived unless the original varnish is washed off with spirits of wine. This work is commonly called "french polish," but costs less than half that of a polished job.



Typical Examples  
of Interior  
Fittings by  
T. S. Gill & Son  
Pty. Ltd.

(Left)—Portion of  
the Store of  
Henry Buck Pty.  
Ltd., Melbourne.

Architects  
Sydney Smith, Ogg  
& Serpell

(Right)—Black-  
wood Bookcase.

Architects  
Stephenson & Meldrum







## D. & W. CHANDLER LTD.

The Biggest Hardware House in Victoria

234-236 FLINDERS LANE, MELBOURNE  
F 4175 (4 lines)

276-294 BRUNSWICK STREET, FITZROY  
J 4145 (7 lines)

And At

Armstrong Street, BALLARAT  
Lava Street, WARRNAMBOOL

Hargreaves Street, BENDIGO  
Pynsent Street, HORSHAM

19f

S.A.A. File No.

[For Other Products, See Pages 36, 76, 120, 251, 492]

### SCHUMITE WALL BOARD

(Passed by the Victorian Underwriters' Association as Fireproof)

#### Description

Schumite Wall Board is a solid and carefully-prepared building material made in convenient sizes and ready for use. It is a wall covering with a reinforced gypsum core, which, in addition to being an excellent insulator, renders it fire and water proof, and a sound deadener. This gypsum core is sufficiently hard and tough to stand rough usage, and yet supple enough to permit easy handling. The binding layer on the outside is a paper of great tensile strength, and will readily take any covering—paint, calomine or wall paper.

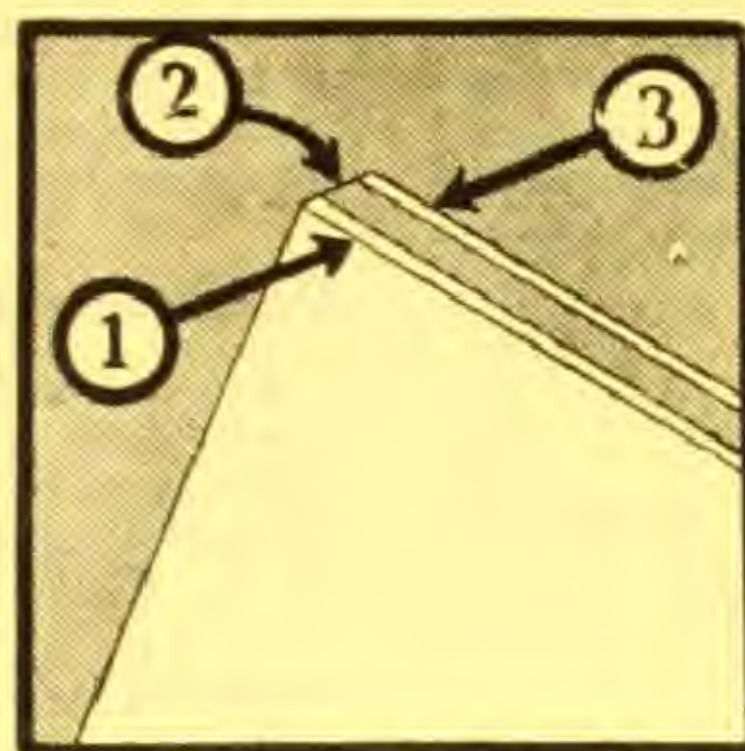
Schumite Wall Board will not warp, expand, shrink, buckle or crack; it bends without breaking, and can be cut or sawn like wood.

Schumite Wall Board is  $\frac{1}{4}$  in. thick, and is available in two widths—3 ft. and 4 ft.—in lengths of 6, 7, 8, 10 and 12 ft.

#### Advantages of Application

The use of Schumite Wall Board for first-class residential interiors ensures a perfectly smooth, even and solid surface—one that will stay as long as the building lasts. It is easily applied, as it comes in convenient lengths that reach from floor to ceiling, and can be sawn and nailed without danger of splitting or cracking.

Weighing less than one-third as much as heavy, fragile boards, it is better adapted to ceilings.



1. Heavy paper, specially prepared to resist moisture, heat, and changeable atmospheric conditions.

2. Massive, specially composed core of reinforced gypsum, deadening sound, fireproof, and water-proof.

3. Covering of tough, sinewy fibre surface of dove grey colour, offering a smooth surface for paint, calomine, wallpaper, or other covering.



Making the Seamless Joint.

Schumite Board is strong and flexible and is not affected by jars or vibration such as sometimes cause thicker boards to loosen and fall. It is thus particularly suitable for application in warehouses, factories, and shops where it may be subjected to these conditions. Schumite is hygienic; its well-fitting seams and plaster core do not offer a hiding place for vermin or dust.

#### Finishes

**Paneling.**—The possibilities of Schumite as a paneling material are many and varied. When in the form of panels it may be left with its own attractive dove-grey colour, or with applied colour, for its surface lends itself readily to the most delicate colour effects.

**A Flat Seamless Wall; an Invisible Joint Ceiling.**—After the boards have been applied as suggested in the Architect's Specification, a perfectly flat finish is obtained as follows: Any rough spots on the surface at the joints are smoothed with sandpaper and the seams filled with special Schumite Putty. The putty is provided in the form of a powder and is mixed with cold water until it has the consistency of ordinary window putty. It is then well worked in, using an ordinary putty knife, as shown in the sketch, and covered with strips of reinforcing tape placed and embedded in the putty along the length of the joint. The knife is then drawn over the tape, squeezing the putty through the tape mesh and levelling the surfaces in the one operation. After the putty is dry, the joints are sandpapered smooth. The surfaces are then ready for papering, painting or calomining.

**Sand Finish.**—A sand finish effect may be obtained by mixing fine, sifted sand with paint. A great variety of effects are possible by mixing sand with various colours, and for cafes, theatres, etc., similar texture finishes are easily applied.

### ARCHITECT'S SPECIFICATIONS FOR SCHUMITE WALL BOARD

#### MATERIAL

The walls and ceilings of the rooms indicated in the following schedule shall be covered with .....X.....ft. Schumite Wall Board sheets as supplied by D. & W. Chandler Ltd.

Note.—Include detailed schedule of surfaces to be covered.

#### FIXING

The sheets shall be applied perpendicularly and parallel to the studding and ceiling joist framing (specified elsewhere), and nailed with  $\frac{1}{2}$ -in. tacks at intervals of 3 in. along all four sides, and to the centre bearing of each board at intervals of 18 inches. The sheets shall be left with  $\frac{1}{2}$ -in. joints, and all tacks shall be carefully punched below the surface.

#### FINISH

A flat seamless finish shall be obtained as follows:—Any rough spots in the surface of the joints shall be sandpapered smooth before the seams are carefully filled with Schumite Putty, over which strips of Schumite reinforcing tape shall be placed and embedded in accordance with the manufacturer's directions. After the putty is thoroughly dry, the joints shall be sandpapered perfectly level and smooth.

Notes.—With the exception of those joints which are not covered by paneling strips, the previous paragraph is not necessary when the Boards are panelled.

Paneling and the application of colour or wallpaper should be specified as desired under the respective headings of "Joiner," "Painter," and "Paperhanger."

#### FRAMING

Notes.—As Schumite Wall Board sheets are manufactured in widths of 3 and 4 feet, the studding and ceiling joists should be spaced at 18 in. or 16 in. centres to suit the respective widths of the sheets specified.

The following paragraphs should be included, as required, under "Carpenter."

**STUDDING** shall consist of 4 in. x 2 in. studs spaced at ..... centres checked  $\frac{1}{2}$  in. deep into top and bottom plates and braced with 3 in. x 1 in. bracing; 4 in. x 2 in. noggings shall be framed in between studs to provide fixing at horizontal bearings of the Schumite Wall Boards.

**BATTENING.**—Battening of brick walls for the fixing of Schumite Wall Board sheets shall consist of 2 in. x 1 in. battens spaced at 18 in. centres and securely nailed to wood plugs inserted in the brickwork joints.

**CEILING JOISTS.**—Note: Specify the size joists and strutting required and add the following:—

3 in. x 2 in. headers shall be framed in between the ceiling joists to provide fixing at the cross joints of Schumite Wall Board sheets.



# WUNDERLICH LIMITED

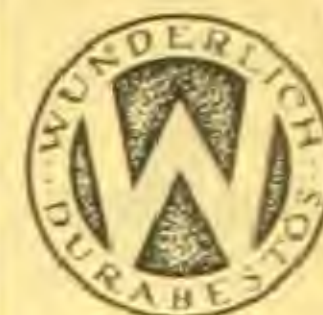
Manufacturers of  
**DURABESTOS (ASBESTOS CEMENT) BUILDING SHEETS**

Administration: BAPTIST STREET, REDFERN, SYDNEY, N.S.W.

Showrooms and Offices:

SYDNEY: Baptist Street, Redfern.  
STH. MELBOURNE: 210 Hanna Street.  
ADELAIDE: Grote and Morphett Streets.  
PERTH: Lord and Short Streets.

BRISBANE: Amelia Street, Valley.  
NEWCASTLE: Builders' Exchange, King St.  
HOBART: 139 Macquarie Street.  
LAUNCESTON: 71 St. John Street.



19f

S.A.A. File No.

[For Other Products, See Pages 22, 55, 93, 102 and 240]

## Durabestos—the Rock-like Lining

Durabestos is a rock-hard Asbestos Cement Sheet, made by Wunderlich Limited at their Cabarita (N.S.W.) and Sunshine (Vic.) Works. It is composed of asbestos fibre and Portland cement, which, by thorough mixture and compression, are united into a homogeneous product, possessing the toughness of the fibre and the hardness of solid concrete.

## Stock Sizes and Thicknesses

Durabestos is available in big, broad sheets. There are two standard thicknesses in everyday use, viz.:—

$\frac{3}{16}$  in., suitable for Walls.

$\frac{5}{16}$  in., recommended for Ceilings.

Numerous sizes are available in each thickness, viz.:—

4 ft. wide, by 4, 5, 6, 7, 8, 9 and 10 ft. long.

3 ft. wide, by 4, 5, 6, 7, 8, 9 and 10 ft. long.

## Weight per Square Yard

The approximate weights of Durabestos Sheets are:—  
 $\frac{3}{16}$  in.: 16.3 lbs. to the square yard;  $\frac{5}{16}$  in.: 14.1 lbs. to the square yard.

## Exterior and Interior Uses

Durabestos will be found an ideal material for the various purposes previously served by timber linings and weatherboards. Externally, it is used for lining Walls; for Gable fillings, Eaves linings, Balcony panels, etc. In the Interior of buildings it is suitable for lining Walls and partitions; and for Ceilings, Door Panels, etc.

## Qualities and Advantages

Durabestos is economical, weather-resisting, fireproof, hygienic, and virtually imperishable. In most parts of Australia it is found to be cheaper than timber, and just as easy to erect. It is really improved by exposure to the weather. Unlike most lining materials, it cannot burn, flake, crumble, rot, corrode, or suffer damage by white ants, borers or rodents.

## Method of Fixing

You nail Durabestos to wall studs or ceiling joists, using special blunt-pointed nails, 1 inch by 14 gauge. At all joints the Sheets are butted—NOT lapped—and it is usual to apply wooden cover battens over the joints. Best effects are obtained when cover battens of liberal width and thickness are used. Alternatively, we can supply Durabestos cover strips.



Durabestos is ideal for Exterior and Interior Walls and Ceilings. It is easy to handle and fix.

## How to Cut Durabestos

When new, Durabestos may be sawn like timber. A more general method is to score a line deeply with a chisel, along the direction of the desired cut (using a batten or straight-edge as a guide), after which the surplus material may be snapped off.

## Decorative Possibilities

The surface finish of Durabestos is as smooth as trowelled cement, and of a pleasing grey colour. This surface lends itself to decoration in colours—when a variation from the natural finish is desired.

## Supplies Obtainable Everywhere

In almost every centre of population in the Commonwealth there is a "stockist" of Durabestos Sheets. Supplies are obtainable, also, direct from our own addresses (see list above).

## Identification

Being made by the exclusive Wunderlich process, Durabestos Sheets possess extreme density, smoothness and rigidity, due to compression in the course of manufacture. If you value these qualities, make sure you obtain DURABESTOS—the name is marked distinctly on every Sheet.

## Special Thicknesses

We make Durabestos Sheets to order in several special thicknesses, comprising  $\frac{1}{4}$  in.,  $\frac{5}{16}$  in.,  $\frac{3}{8}$  in.,  $\frac{1}{2}$  in.,  $\frac{5}{8}$  in., and  $3$  in. thick. To ensure satisfactory delivery, it is advisable to give us early particulars of sizes required.

## "Duratile"— for Bathrooms, etc.

"DURATILE" is Wunderlich Durabestos, patterned to look like 4 inch square Tiles. It is made in Sheets measuring 4 ft. by 4 ft., and 4 ft. by 3 ft. An ideal material for lining Bathrooms, Kitchens, etc.

## Catalogues and Samples

On request we will supply particulars and samples of Durabestos and Duratile; also a free copy of our book entitled "Durabestos Homes of Colourful Beauty," which provides designs, plans and colour schemes for modern Durabestos Homes.



## SECTION H

[Containing S.A.A. Filing Sections Nos. 20 and 21]

## PLASTERING





21a

S.A.A. File No.

Cable and Telegraphic Address:  
 "Plaster" Melbourne; "Plasco" Sydney; "Plaster" Brisbane.

## AUSTRALIAN GYPSUM PRODUCTS PTY. LTD

AGENTS AND SUPPLIERS FOR VICTOR ELECTRIC PLASTER MILLS PTY. LTD.,  
 AUSTRALIAN GYPSUM LTD., AND PENINSULA PLASTER CO. PTY. LTD.  
 MELBOURNE — SYDNEY — BRISBANE

Head Office:

LORIMER STREET, SOUTH WHARF, SOUTH MELBOURNE, S.C.5.

Phones: M 2431, M 3602.

Sydney Office: No. 15 Wharf, Pyrmont,  
 N.S.W. Phone: MW 1067.

Brisbane Office: Bowen Street, Brisbane,  
 Queensland. Phone: B 3806.

And at Newcastle and New Zealand.

**VICTOR**

AND  
 WARATAH  
 HIGH-GRADE  
 PLASTER  
 AND  
 VICTOR-  
 GYPSUM  
 PRODUCTS

### Products

Victor and Waratah High-grade Plaster.  
 Victor Sanded Plaster (prepared).  
 Victor Hard Finish.  
 Victor Hardwall Setting (prepared).  
 Victor Cement Plaster.  
 Victor (FFF) Dental Plaster.  
 Victor Patching Plaster.  
 Victor Acoustic Plaster.  
 Victortex.  
 Victor-Gypsum Partition Blocks.  
 Victor-Gypsum Hollow Floor Blocks (Innes-Bell Systems).

(See pages 61-66, inclusive, for these products.)

### Facilities

Australian Gypsum Products Pty. Ltd. rank as Pioneers of the Gypsum Industry, having gypsum mines located in various centres of the Commonwealth and Mills equipped with the most modern machinery for the manufacture of the well-known Victor and Waratah brands of high-grade plaster, and Victor-Gypsum products, incorporating the Innes-Bell patented systems of Gypsum Hollow Floor Blocks. Specifications and detailed information regarding Victor-Gypsum Partition Blocks and Hollow Floor construction are given on pages 61-66, inclusive.

The Mines and Mills, electrically operated, have a capacity output capable of meeting the total requirements of the Commonwealth and New Zealand, and provision has also been made for an immediate increase in output at any future date.

Complete control of operations from the Mines to the finished products for the building is made possible by close co-ordination in all branches of A.G.P., thus assuring maximum satisfaction to Architects, Engineers, Builders and others.

Special features of the large organisation of A.G.P. are the research laboratories, where regular tests of all raw materials used in manufacture, also products ready for despatch, are made in order to conform to Standard requirements, and a guarantee of the manufactures bearing the registered trade name, VICTOR, Reg. No. 7759, and Letters Patent numbers.

### Gypsum

Gypsum is one of the oldest of building materials. Excellent examples of the use and permanent structural qualities of gypsum are found in ancient Greek Temples and in the Egyptian pyramids erected thousands of years ago.

Gypsum is a hydrous calcium sulphate ( $\text{Ca SO}_4 \cdot 2\text{H}_2\text{O}$ ) found in rock formation. The rock gypsum is crushed and ground and then calcined, during which process the gypsum loses portion of its water, thus forming a hemihydrate or plaster of Paris, the formula of which is  $2\text{Ca SO}_4 \cdot \text{H}_2\text{O}$ .

State Analyst's reports, available for perusal, show Victor Gypsum to be of high analysis and uniform run, and comparable with the best grade gypsum from any part of the world.



HOWEY COURT, COLLINS STREET, MELBOURNE.  
 Marcus R. Barlow, Architect.

Illustrating a Modern 12-Storey Structure, in which Victor-Gypsum Blocks and Victor Plaster have been used.

### Literature

Literature, including specifications for the use of A.G.P. products, will be sent on request to Architects, Engineers, Builders and others interested in obtaining information, on application to the above offices.

### Victor and Waratah High-Grade Plasters

Both Victor and Waratah comply with the required specification of the Standards Association of Australia for high-grade plaster to be manufactured from gypsum assaying not less than 97 per cent. pure calcium hydrate.

Leading manufacturers in the Fibrous Plaster Industry throughout the Commonwealth testify to the superior quality of fibrous sheeting manufactured to required thickness, also panels, cornices and moulds produced with the use of Victor or Waratah plaster, both of which are uniform in working and combine colour, strength and permanence, and assure durability for the handling and fixing of the fibrous products according to the Architect's specifications.

### Victor Sanded Plaster

Victor Sanded Plaster is a prepared rendering or floating coat consisting of a base of gypsum plaster, to which is added clean, sharp sand, correctly graded and proportioned. It requires only the addition of water and is used for the same purpose as cement and sand or lime and sand for floating internal walls.

Being already proportionately mixed, it saves considerable time on the job and assures accurate gauges. By its use, surface or hair cracking in the walls is eliminated, and a good base is formed for an application of an approved brand of water colour paint (to which may be added a small quantity of petrifying liquid). Alternately a setting coat may be applied of Victor Hard Finish or Victor Hardwall Setting, in the usual way.

A special feature of Victor Sanded Plaster is its quick drying quality, which enables often the whole of the wall work, i.e., rendering floating and setting, to be completed in hours, compared with days, when other materials are used.

Victor Sanded Plaster assures a perfect bonding, also floating coat for Victor-Gypsum Partition Blocks. (See specifications for use of Victor Plaster.)

### Victor Hard Finish

Victor Hard Finish or Victor Hard, as it is familiarly known to Architects and Builders, is recognised as the most sanitary finishing plaster produced. It may be painted or papered as soon as it is dry, having a hard surface like a Keen's cement. There is no tendency to shrinking or cracking, and it adheres to any surface. When set, it is as water-resisting as any surface procurable from a gypsum plaster base.

(See specifications for use of Victor Plaster.)

(Continued on next page.)



**Victor Hardwall Setting**

Victor Hardwall Setting is a prepared setting coat, clean water only having to be added. It is used as a finishing plaster and assures a good white wall which will not crack or shrink. Being fully prepared and ready for use, it saves considerable time on the job. (See specifications for use of Victor Plaster.) **When painting or papering of wall is required, use Victor Hard Finish.**

**Victor Cement Plaster**

Victor Cement Plaster requires addition of sand only and is economical on large jobs, and particularly country centres, where a good clean sharp sand is avail-

able. It is supplied containing the fibre or left unfibred for rendering or floating coats over wood lath, concrete, brick, tile, or Victor-Gypsum Block surfaces. (See specifications for use of Victor Plaster.)

**Victor Acoustic Plaster**

Victor Acoustic Plaster is a specially prepared gypsum plaster for acoustical correction. Literature containing further information and directions for use is available on application.

**Victortex**

Victortex is a decorative plaster finish ready for use with the addition of water only. It is used as a finish coat over the regular base coats of plaster. Further information and specifications are available on request.

**ARCHITECT'S SPECIFICATIONS FOR USE OF VICTOR PLASTER****MATERIALS.****(1) PLASTERS.**

All plasters shall be the following as manufactured by Australian Gypsum Products Pty. Ltd.:—

Plaster for Rendering and Floating Coats.—(1) Victor Sanded Plaster, or (2) Victor Cement Plaster.

Plaster for Setting Coats.—(1) Victor Hard Finish, or (2) Victor Hardwall Setting.

Note.—Strike out those not desired.

**(2) SAND.**

Sand shall be clean, sharp, and free from loam, clay, salt, vegetable matter, or other impurities.

**(3) LIME.**

Lime for lime putty, when specified, to be mixed with Victor Hard Finish, shall be fresh burned, carefully sieved, and perfectly slaked before use.

**(4) WATER.**

Water shall be fresh and clean, free from any impurities.

**(5) METAL LATHING.**

Metal lathing shall be of an approved brand (or specify a particular brand), fixed with galvanized staples every 18 in. to framing.

**(6) WOOD LATHS.**

Wood laths shall be of 1 in. sawn oregon, spaced 1 in. apart, and well nailed with galvanized lath nails to each bearing.

**WORKMANSHIP.****(7) GENERAL.**

The whole of the work is to be executed to the entire satisfaction of the Architect.

The Contractor shall provide and erect all scaffolding, staging, etc., and provide all tools necessary for the proper execution of the work.

Mixing boxes shall be clean and watertight.

Tools shall be kept clean and must not be rinsed in the gauging water.

All plasters shall be stored in a dry place raised above the ground level.

**(8) MIXING.**

No more material than that which can be applied in approximately one hour shall be mixed at the one time.

Plaster, after it has commenced to set, shall not be re-tempered.

When sand and Victor Cement Plaster are to be mixed together, the two materials shall be mixed thoroughly dry before adding water.

Lime Putty and Victor Hard Finish shall be thoroughly and uniformly mixed to the proper consistency.

**(9) BASE (RENDERING AND FLOATING COATS). PLASTER ON WOOD LATH.****I. Using Victor Sanded Plaster.**

(a) First (rendering) and Second (floating) coats shall consist of Victor Sanded Plaster (to which fibre shall be added) and then properly mixed with water.

(b) Wood laths shall be thoroughly wetted before first fibred coat is applied, which shall be applied with sufficient pressure to fill the spaces between lathing to obtain a good key. This coat shall be scratched to form a bond for the second coat.

(c) Second coat shall be applied when the first coat is set, but before it is dry. It shall be applied with strong pressure and screeded to a true level plane ready to receive finish (setting) coat.

**II. Using Victor Cement Plaster.**

(a) First (rendering) coat shall consist of one part Victor Cement Plaster, fibred, with two parts, by weight, of dry sand.

(b) Second (floating) coat shall consist of one part of Victor Cement Plaster, fibred, to three parts, by weight, of dry sand.

(c) Use paragraph (b).

(d) Use paragraph (c).

**(10) BASE (RENDERING AND FLOATING COATS). PLASTER ON METAL LATH.****I. Using Victor Sanded Plaster.**

(a) Use paragraph (a) above for Wood Lath.

(b) First coat shall be applied with sufficient pressure to fill all the meshes and obtain a good key. This coat shall be scratched to form a bond for second coat.

(c) Use paragraph (c) above for Wood Lath.

**II. Using Victor Cement Plaster.**

(a) Use paragraph (a) above.

(b) Use paragraph (b) above.

(c) Use paragraph (c) above.

(d) Use paragraph (d) above.

**(11) BASE PLASTER ON MASONRY.****I. Using Victor Sanded Plaster.**

(a) Base coat plaster shall consist of Victor Sanded Plaster properly mixed with water.

(b) The surfaces of brick, tile, or Victor-Gypsum block walls shall be thoroughly wetted before plastering, when necessary, to overcome excessive suction. The plaster shall be applied to fill out to grounds and, before drying, it shall be broomed to receive the later specified finish coat.

**II. Using Victor Cement Plaster.**

(a) Base coat plaster shall consist of one part of Victor Cement Plaster and three parts, by weight, of dry sand.

(b) Use paragraph (b) above.

**(12) BASE PLASTER ON CONCRETE.**

(a) Concrete surfaces to be plastered shall have all dust and loose particles brushed from the surface, which shall then be washed with clean water. Exceptionally smooth surfaces shall be roughened to form a background for the plaster.

Note.—Base Coat Plaster as specified in paragraphs (a) or (a5) can now be applied in a similar manner to that specified in paragraph (b).

**(13) SMOOTH WHITE FINISHING COAT.**

Note.—Victor Hard Finish and Hardwall Setting Plasters can be used on any cement or lime plaster base.

**I. Using Victor Hard Finish.**

(a) The Finishing (setting) Coat shall consist of one measure of Victor Hard Finish to not more than three of lime putty.

Special Note.—When used to take the place of Keen's Cement, or to be immediately papered or painted, specify Victor Hard Finish to be used pure without the addition of lime.

(b) The Finishing Coat shall be applied when the base coat is set firm and nearly dry. The base coat shall be sprinkled with water and the finishing coat applied by first skimming with float, taking care that skimming coat is rubbed very lightly into base coat to ensure perfect cohesion. The finishing coat shall then be completed by laying with trowel to a true level and plumb surface, free from trowel marks and blotches.

**II. Using Victor Hardwall Setting.**

(a) The Finishing Coat shall consist of Victor Hardwall Setting Plaster mixed to the proper consistency with clean water only.

Special Note.—On no account add Lime Putty.

(b) Use paragraph (b) above.



<p><b>21b</b></p> <p>S.A.A. File No.</p>	<p align="center"><b>PICTON HOPKINS &amp; SON PTY. LTD.</b></p> <p align="center"><i>Plastering Contractors • Architectural Modellers</i></p> <p align="center"><i>Fibrous Plasterers</i></p> <p align="center"><b>265A BRIDGE ROAD, RICHMOND</b></p> <p align="center"><b>VICTORIA</b>      Tel.: J 2160-2169.</p>	<p align="center"><b>"PICTON" FIBROID</b></p>
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## CONTRACTING

### History

For over 60 years the name of Hopkins has been identified with good Plastering. Since that time the firm—the present company was formed in 1924—has closely studied the requirements of the building trades as far as the various divisions of plastering work are concerned. Its plant facilities and equipment have been, with detailed attention, designed to adapt each of its products to meet these varying requirements.

### Complete Plastering Contracts

Because of the facilities later stated and the possession of complete contracting equipment, comprising scaffolding, lashings, tools, etc., we are competent to undertake plastering contracts of any type or magnitude. By this method we not only reduce the cost of the job by reason of materials and labour coming from the one source, but assume undivided responsibility, making us directly answerable to the architect. Detailed information and quotations will be given on application.

### Some Recent Contracts

National Bank of Australia, Melbourne. Architects: A. & K. Henderson.  
 A.P.A. Building, Melbourne. Architects: Morsby & Coates.  
 Athenaeum Club, Melbourne. Architect: Cedric H. Ballantyne.  
 Comedy Theatre, Melbourne. Architect: Chas. N. Hollinshed.  
 Temple Court, Melbourne. Architects: Barlow & Hawkins.  
 Hotel Alexander, Melbourne. Architect: Leslie M. Perrott.  
 "Herald" Office, Melbourne. Architects: H. W. & F. B. Tompkins.  
 A.M.P. Building, Melbourne. Architects: Bates, Smart and McCutcheon.  
 Regent Theatres in Melbourne, Sydney, Adelaide, Auckland, and Wellington. Architect: Cedric H. Ballantyne.  
 Regent Theatre, Brisbane. Architect: Charles N. Hollinshed.  
 New Harbour Trust Building, Melbourne. Architects: Sydney Smith, Ogg and Serpell.



**A.P.A. BUILDING, MELBOURNE.**  
 Morsby & Coates, Architects.  
 Picton Hopkins & Son, Plastering Contractors.

### Quality of Products

Products bearing the name or brands of Picton Hopkins & Son Pty. Ltd. are safeguarded against imperfection by rigid inspection at every stage of production. This supervision of quality over a long period of years has resulted in the name of Picton Hopkins & Son Pty. Ltd. as being synonymous with the highest standard of plaster products.

### Designing Services Available

Our staff of architecturally-trained designers are at your service for the purpose of co-operation in expressing your original ideas. These men will—without obligation on your part—prepare estimates and schemes for any class of modern or period interior decoration.

### Scaffolding Service

The erection of secure and rigid Scaffolding requires not only experienced erectors but a continuously inspected equipment of strong, well-seasoned poles, put logs, ledgers, boards, etc. Picton Hopkins & Son Pty. Ltd. maintain such a standard in

their own work and that erected for the use of others. Contracts for the supply and erection of all forms of scaffolding for use in decoration, the cleaning down, or repairs to buildings are undertaken by this firm.

### Facilities

The superiority of our products, and success in the contracting field, is based upon the following features:—

1. Use of high-grade materials.
2. Perfected processes of manufacture.
3. Possession of the services of the leading architectural modellers and craftsmen in Australia.
4. Employment of organised groups of workmen.
5. Complete contracting equipment.
6. Ample reserves of all plastering materials, thus making us independent of other sources when urgent jobs of an extensive scale are received.
7. Complete distribution facilities—consisting of a fleet of motor trucks.

*(Continued on next page)*



## FIBROUS PLASTER SHEETS

## Materials and Manufacture

Pickton Fibroid Plaster Sheets for interior walls and ceilings are manufactured with the highest grade of plaster of paris and reinforced with "A" Grade sisal hemp, which is the toughest and most durable of its kind. The sheets are finished with a perfectly smooth surface, and after completion they are racked and dried in special drying rooms, where they are subjected to a natural stream of cool air.

Delivery can be made by our motor trucks to any part of Victoria. Careful crating before transportation ensures their safe delivery.

In addition to the stock sizes indicated below, we can supply continuous wall sheets of  $\frac{3}{8}$  in. and  $\frac{1}{2}$  in. thickness, 6 ft. and 7 ft. wide, up to 18 ft. in length.

$\frac{3}{8}$  in. sheets are all made with rebated joints to produce a flush surface, if required;  $\frac{1}{2}$  in. thickness sheets are finished with square edges.

## Stock Sizes

Sheet Thickness in Inches.	Sheet Size in Feet.			
$\frac{1}{8}$ in.	6ft. x 3ft.	6ft. x 4ft.	6ft. x 4ft. 6in.	6ft. x 5ft.
$\frac{1}{4}$ in.	7ft. x 3ft.	7ft. x 4ft.	7ft. x 4ft. 6in.	7ft. x 5ft.
$\frac{3}{8}$ in.	8ft. x 3ft.	8ft. x 4ft.	8ft. x 4ft. 6in.	8ft. x 5ft.
$\frac{1}{2}$ in.	9ft. x 3ft.	9ft. x 4ft.	9ft. x 4ft. 6in.	9ft. x 5ft.
$\frac{3}{4}$ in.	10ft. x 3ft.	10ft. x 4ft.	10ft. x 4ft. 6in.	10ft. x 5ft.
$\frac{7}{8}$ in.	6ft. x 3ft.	6ft. x 4ft.	6ft. x 4ft. 6in.	6ft. x 5ft.
1 in.	7ft. x 3ft.	7ft. x 4ft.	7ft. x 4ft. 6in.	7ft. x 5ft.
$\frac{1}{2}$ in.	8ft. x 3ft.	8ft. x 4ft.	8ft. x 4ft. 6in.	8ft. x 5ft.
$\frac{3}{4}$ in.	9ft. x 3ft.	9ft. x 4ft.	9ft. x 4ft. 6in.	9ft. x 5ft.
$\frac{7}{8}$ in.	10ft. x 3ft.	10ft. x 4ft.	10ft. x 4ft. 6in.	10ft. x 5ft.

Also in both thicknesses—5ft. x 5ft.; 5ft. x 4ft. 6in.; 5ft. x 4ft.

## ORNAMENTAL FIBROUS PLASTER

## Fabrication

During the process of fabrication, Pickton Hopkins' Ornamental Plaster has all the advantages of skilled workmanship and careful supervision, which results in its superior qualities of strength, durability and good appearance.

Our competent staff of modellers ensures the production of accurate casting moulds, which may be of plaster, cement or wood, according to the nature of the requirements and finish of the final casting. Enrichments of ornament are formed in gelatine moulds because of the great latitude allowed in casting beautiful, richly-moulded members with under-cut relief ornament.

Great care is exercised in executing the finished castings, which, after being reinforced with hemp, hessian and laths, are removed to the drying rooms, where they are allowed to completely harden prior to transportation.

Cornices and mouldings being already reinforced in themselves by the scientific placing of reinforcing ribs, additional structural framing for tying is, in most cases, unnecessary.

## Fixing

To secure the architect's satisfaction, we prefer to undertake the complete contract of fabrication and fixing. This arrangement not only ensures sound and solid fixing, but reduces fixing costs, as our skilled fixers, whose time is completely devoted to this class of work, are naturally able to complete a contract in much less time than men who are not continuously engaged as fibrous plaster fixers. If this, however, is not possible or practicable, we urge that the architect insist upon the employment of competent fixers only. We recommend this, as our interest in our fibrous plaster products follows right up to the complete installation, and we have no wish to see injustice done to our work by careless or faulty fixing.

In jobs of a large scale or comprehensive nature, an early discussion on fixing methods is advantageous. With our co-operation every important detail can be considered and decided before the actual work is commenced.

## Stock Designs

Pickton Hopkins' Fibrous Plaster, with its adaptability, durability and comparatively low initial cost, is available in a wide range of stock designs embracing the breadth and treatment of mediæval period work, the refinement and precision of classical ornament, and the symbolism of modern art, any of which may be adapted to the treatment of the most modest home or to the highly decorated mansion.

On the following pages there are shown a few designs which are typical of the huge range held in stock. Assistance and suggestions in selection will be gladly given.



Side Wall Treatment, Regent Theatre, Brisbane.

Plate No. 1 shows a series of mouldings and cornices suitable for application in cafes, hotels, etc., or the larger size home.

Those on Plate No. 2 give refinement, at an economical cost, to the home of more moderate dimensions.

The ceiling panels on Plate 3 include some examples of modern work, as well as those typifying the elegance of the popular Adam Period.

Plate 4 illustrates wall panels, expressing the grace and daintiness of the Renaissance era.

Plate No. 5 shows a miscellaneous collection of plaques, medallions, bosses, etc., which so often contributes to the success of an interior decoration scheme.

## Special Designs

Our modern shop and facilities permit endless possibilities for the reproduction in fibrous plaster of the Architect's individual designs. We are able to obtain a variety of effects—from those produced by simple mouldings relieved with low relief ornament to richly-moulded members embellished with elaborate ornament. Continuous ornament in fibrous plaster is economical and is most advantageous for mass production and rapid erection.

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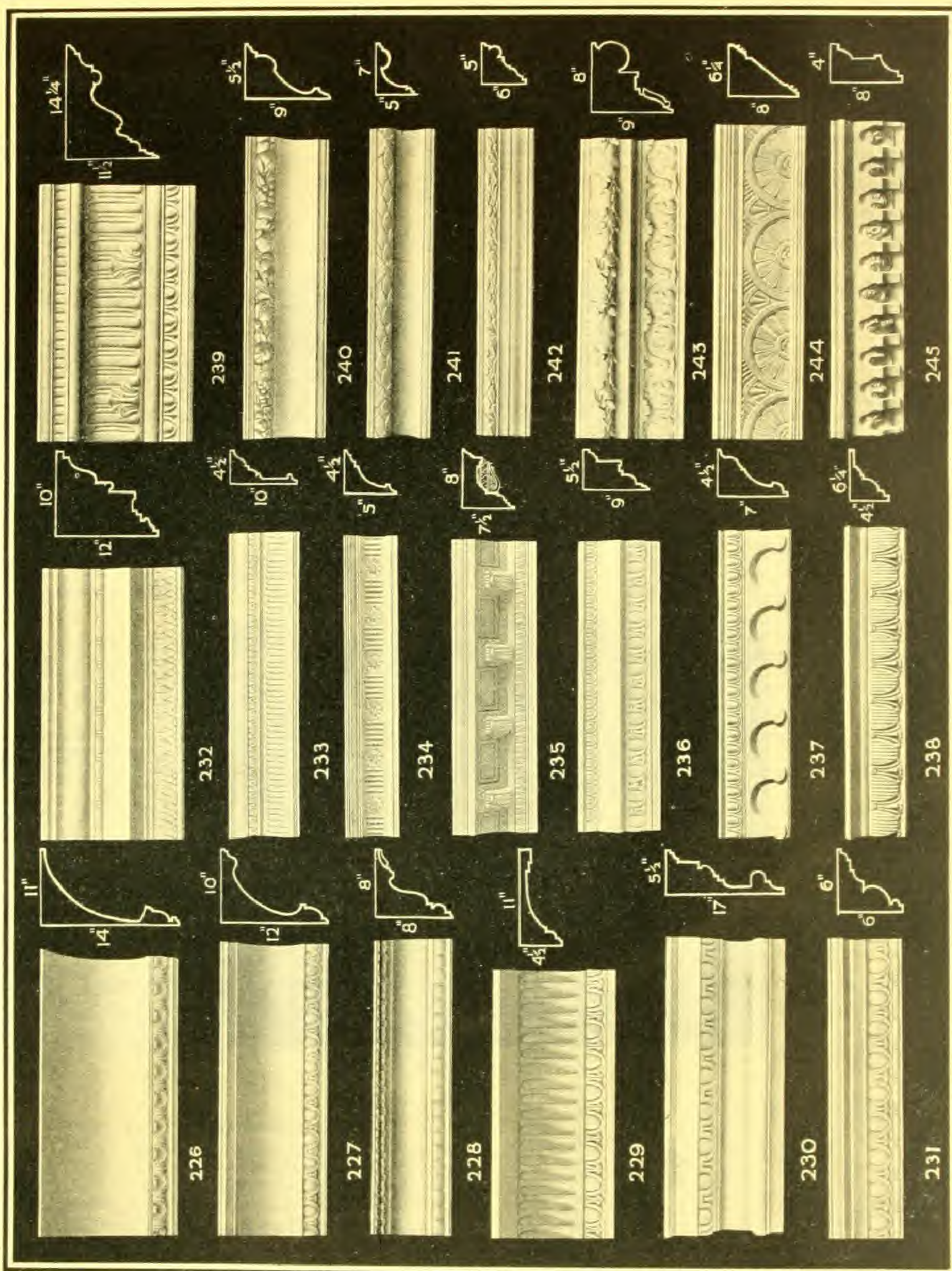


PLATE No. 1—MOULDINGS AND CORNICES.

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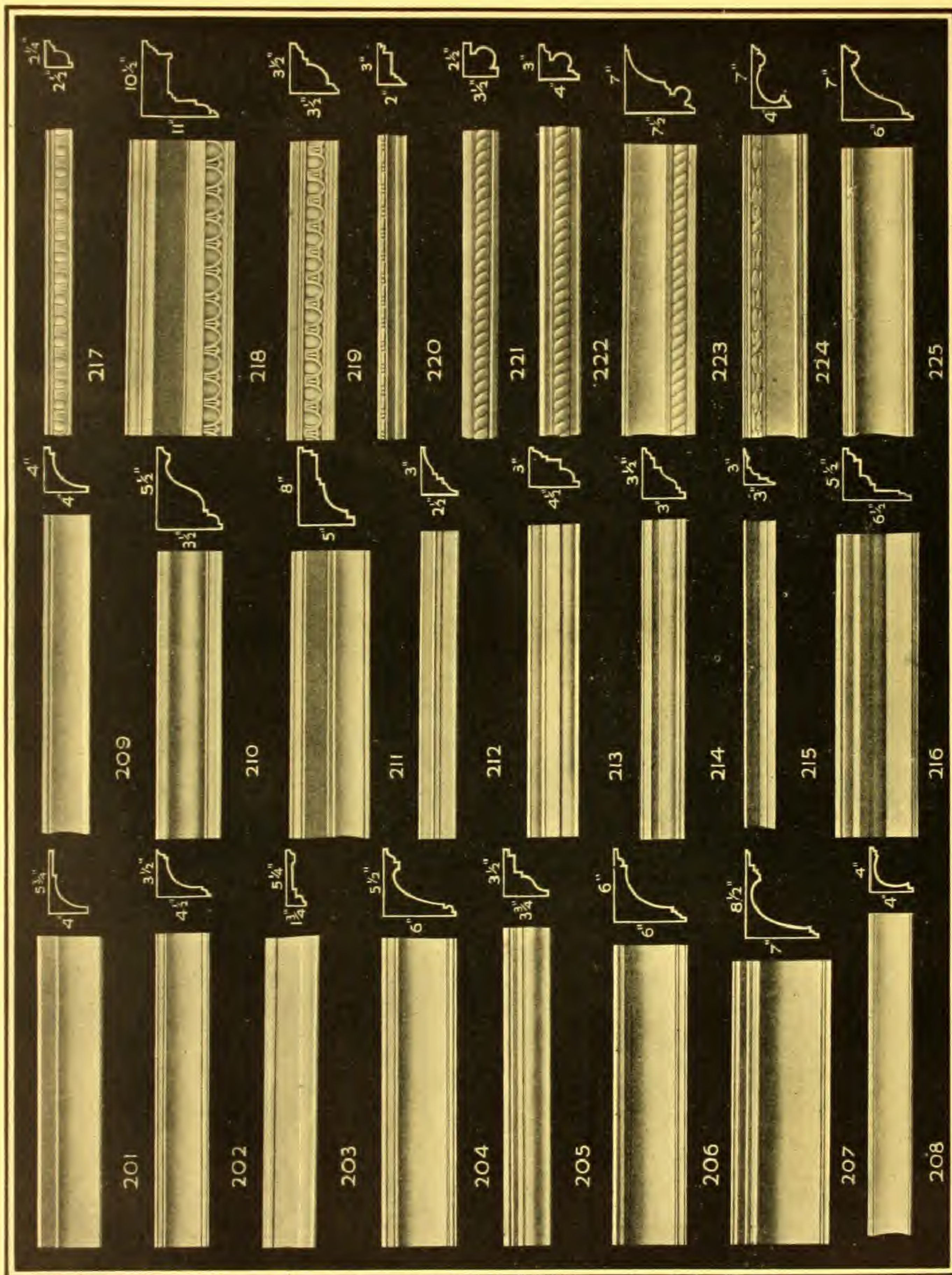


PLATE No. 2—MOULDINGS AND CORNICES.

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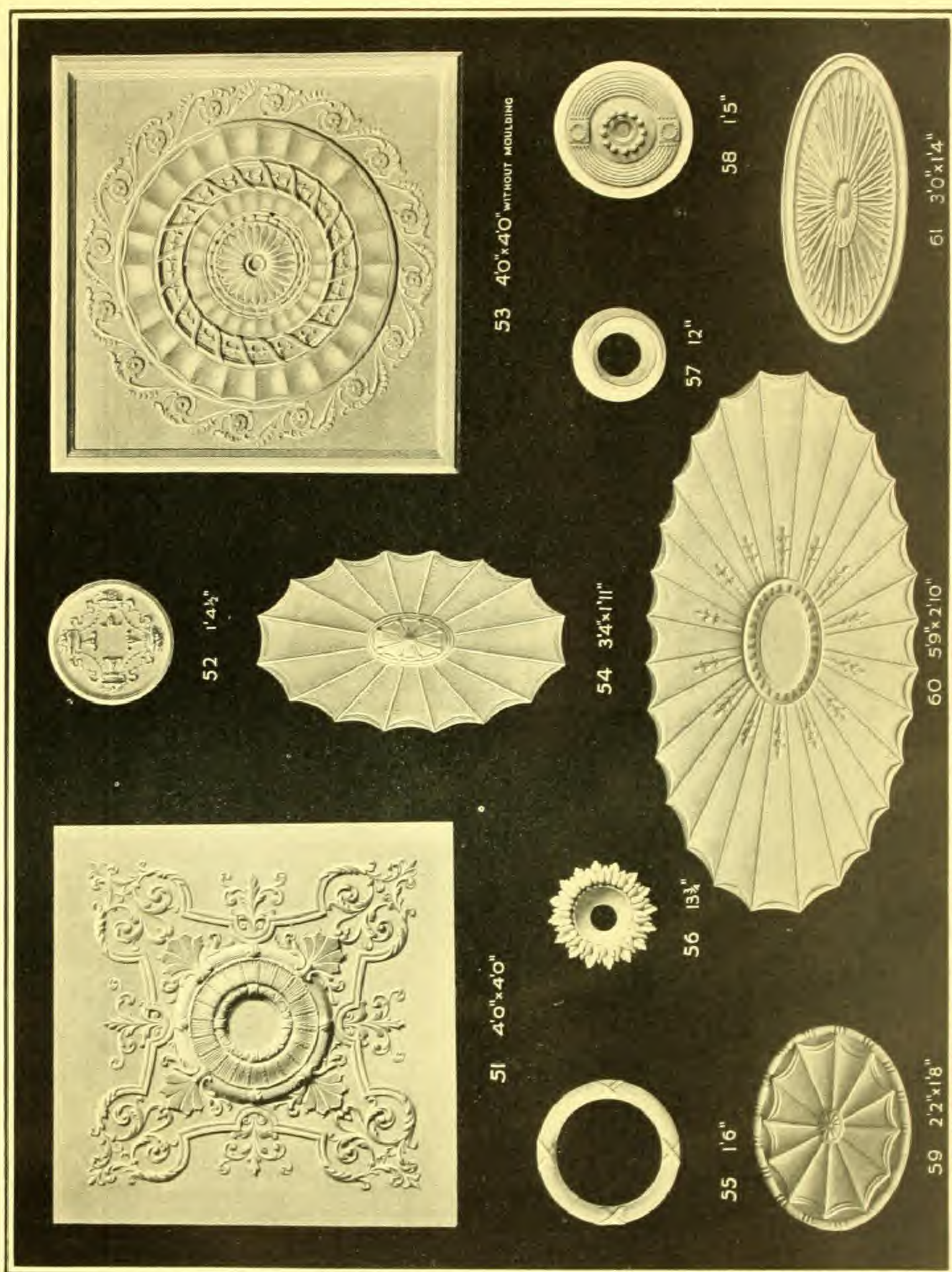


PLATE No. 3—CEILING PANELS.

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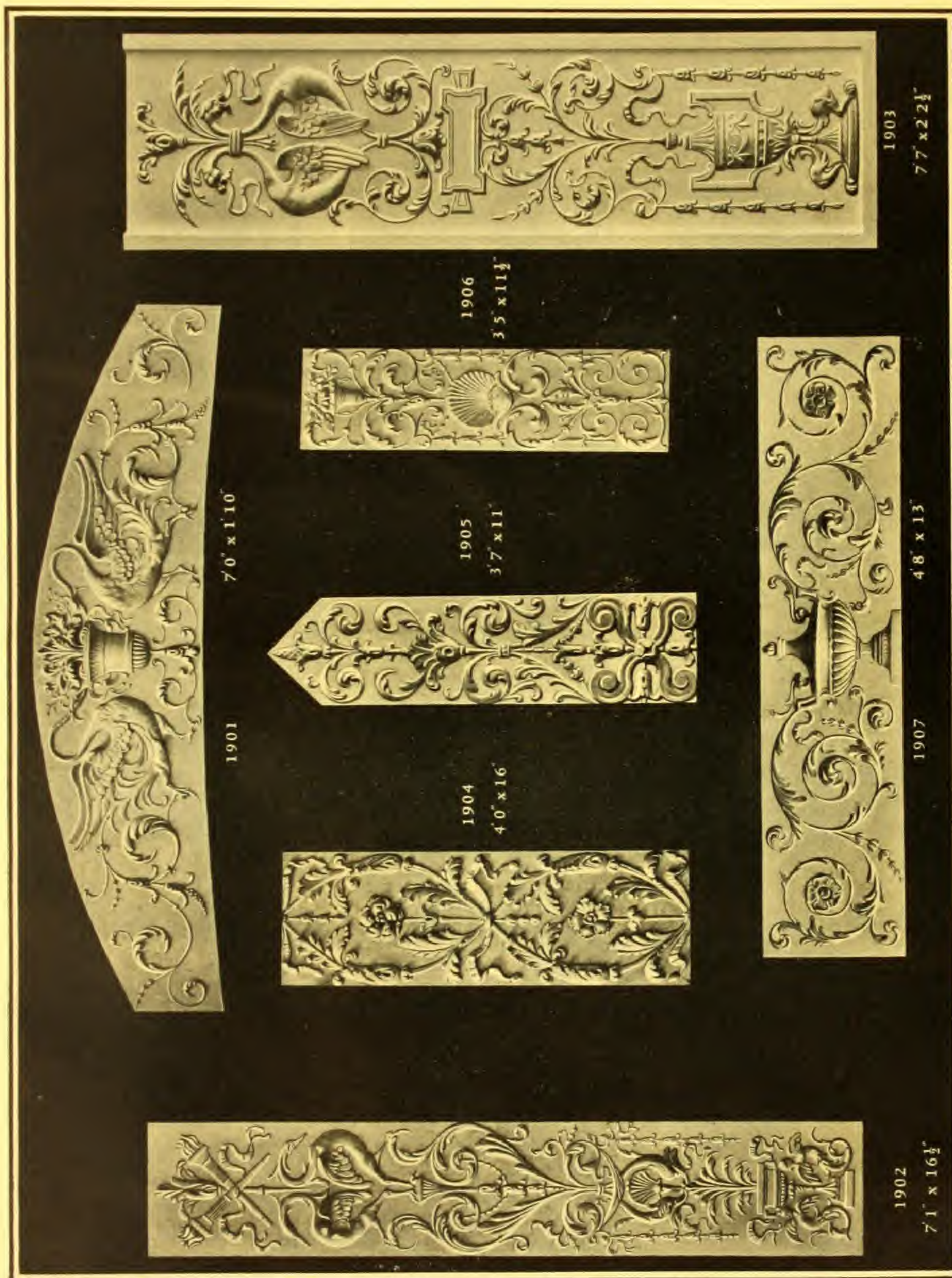


PLATE No. 4—WALL PANELS.

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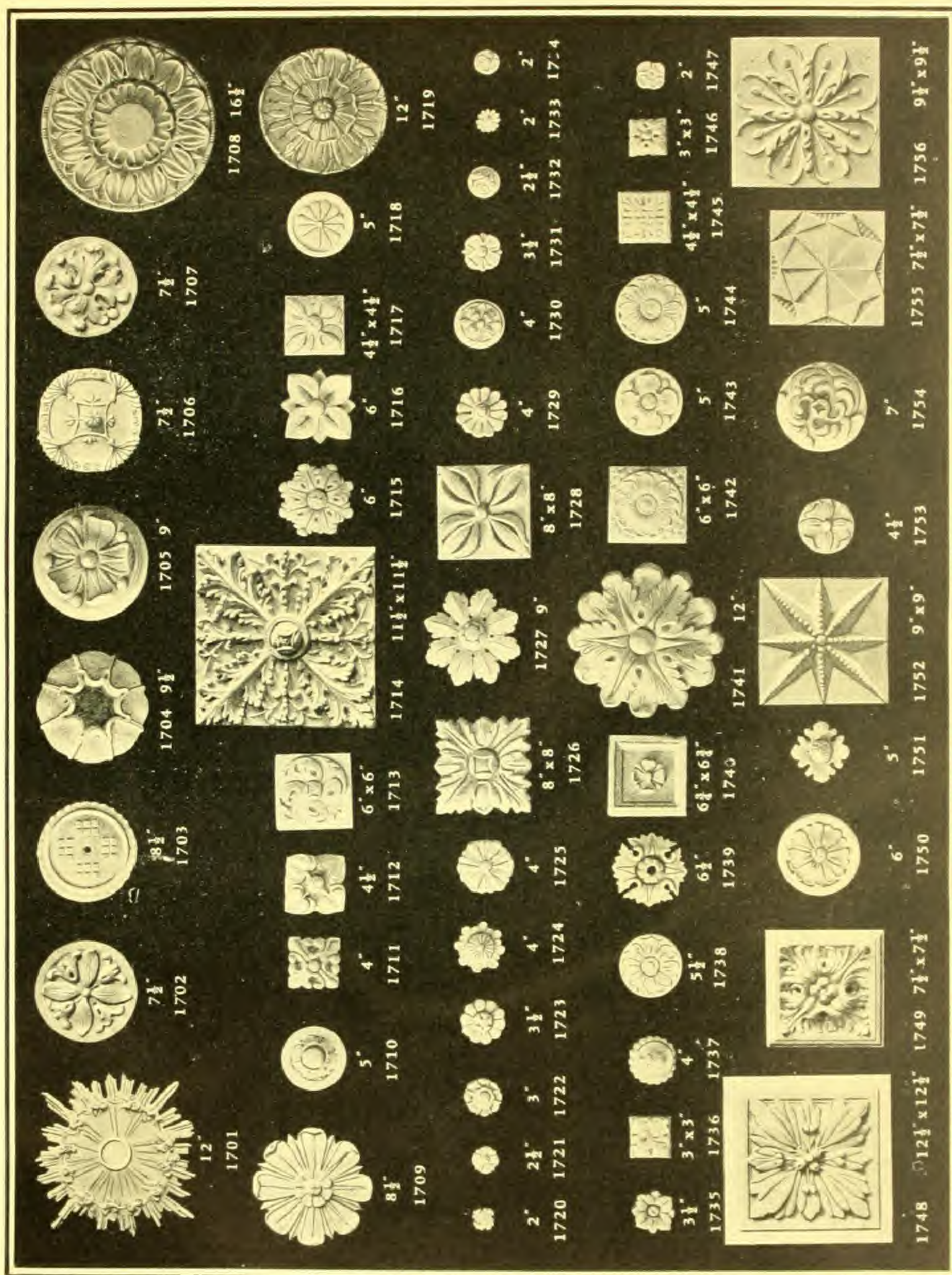


PLATE No. 5—PLAQUES; MEDALLIONS; BOSSES.

(Continued on next page)



## TEXTURAL WALL EFFECTS

## Textured Wall Finishes

During recent years there has been a considerable development in textured finishes for external stucco and internal plaster finishes. The home owner has learnt to appreciate the charm of depth and colour, while the architect has enthusiastically seized his opportunity in reproducing his conceptions of the mellow beauty, colour and texture of the picturesque walls of the Old World.

The range of effects is great—an infinite variety of colour and texture being obtainable. But often, through poor materials, workmanship and lack of imagination by the craftsmen, the desired effects are limited in their ultimate achievement. It is only by the use of high-grade materials and skilled craftsmen—such as maintained by Picton Hopkins—that these colourful texture finishes can be satisfactorily applied.

## Application

We have specially organised facilities for the execution of textural wall effects, and can undertake to supply materials, tools and scaffolding, etc., and faithfully carry out the intent of the architect's design, no matter of what period or how simple or bizarre it may be. We will either carry out the complete operation, i.e., from the first rendering coat to the finished textured finish, or apply our texture to first and second coat work prepared by others.

Some of our recent applications include those in Wentworth House and the Regent and Comedy Theatres, Melbourne.

## Materials

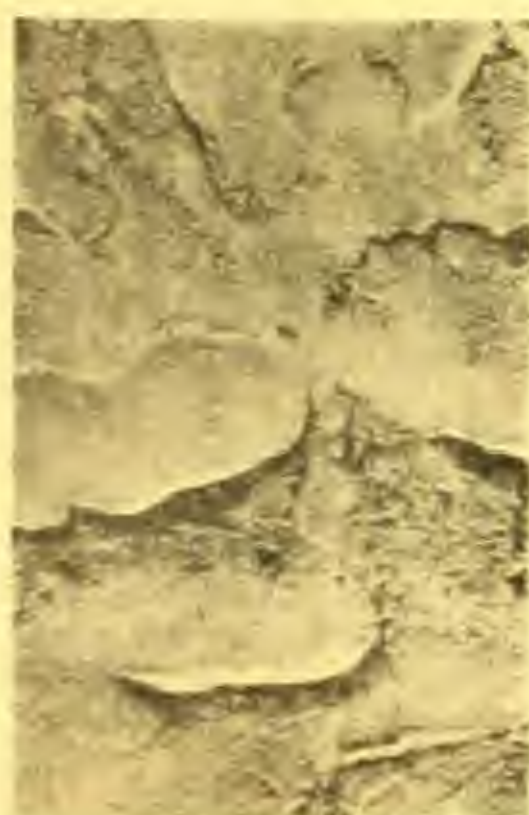
The materials utilised for both interior and exterior textures are selected from the highest grade of those available.

Great importance is attached to the preparation of textures in which mineral oxides, pigments or various kinds of sand may be used. When pigments are used, they are carefully ground and graded in the proper proportions before being sent out, so as to obtain absolute uniformity when applied.

Often, when varying tones and shades are required for the one finish, necessitating the use of three or four pigments, the above preparation is of great advantage when compared with some types of textures which are prepared on the job. The risk of allowing this to be carried out in the absence of proper measuring and weighing facilities and means of expert colour selection can be readily appreciated by the architect. Our experience in the selection and grading of materials and non-fading colours ensures complete uniformity and quality and assurance of obtaining the desired finish.

## Colour and Texture Selection

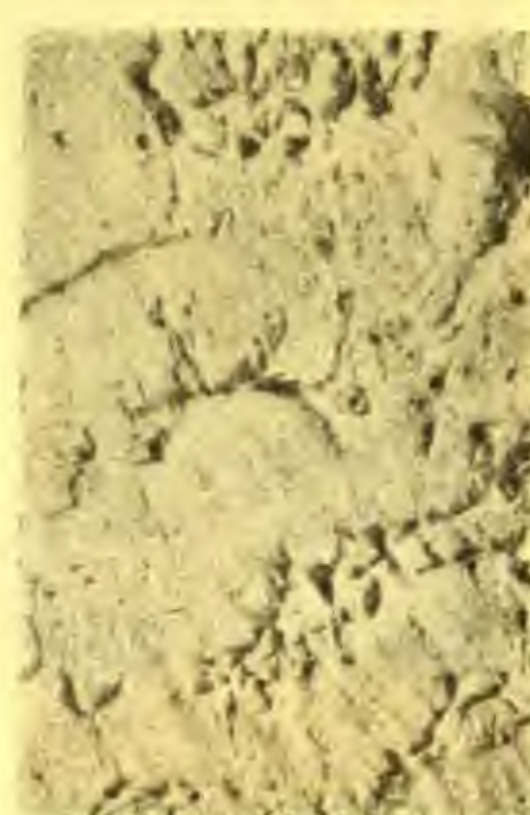
You are invited to confer with Picton Hopkins & Son Pty. Ltd., who will offer suggestions regarding the selection of various modern and period texture finishes. We will show you photographs of outstanding work, and, if desired, an actual demonstration can be arranged which will show some of the beautiful and unique finishes we can produce. Through personal contact, we are convinced that we can demonstrate to you the thoroughness of our work and its economic advantages in the shape of durability and permanence.



English



Spanish



Italian



French

Texture Wall Effects that can be satisfactorily applied by Picton Hopkins' craftsmen.

## Pressed Cement Work

Ornamental work and enrichments for imparting dignity to buildings having external stucco walls can be economically and satisfactorily produced in pressed cement by Picton Hopkins & Son Pty. Ltd. Schemes submitted to us will be faithfully followed and produced with all the crispness and clean-cut features that may be embodied in the design.

Briefly, the process of manufacture is as follows:—After the architect's design has been carefully modelled and cast in plaster of paris sectional moulds, material consisting of Portland cement and well-graded, clean sand, thoroughly mixed to proper proportion and consistency, is pressed firmly into the moulds and allowed to reach a stage of incomplete setting before the moulds are stripped. After this, the work is kept in a moist condition until it is completely set and hardened, and ready for delivery to the job.

## Wood Carving

Due to presence in the studios of skilled wood carvers whose services are principally engaged for the carving of elaborate wood moulds for the production of ornamental fibrous plaster castings, Picton Hopkins & Son Pty. Ltd. are able to undertake work covering the complete range of wood carving necessary for the embellishment of ornamental woodwork.

The craftsmen employed by us have had wide experience in all phases of their craft, and are fully competent to carry out such work as the carving of ornamental panels, church furniture, wood statuary, etc., which may be submitted to us for finishing off from its rough carved conditions, or for working up from the preliminary to final stages. Demonstrations by these men will prove their ability in executing any of the foregoing work.

(Continued on next page)



## PRE-CAST STONE

## Adaptability of Pre-Cast Stone

Pre-cast Stone, as manufactured by Picton Hopkins & Son Pty. Ltd., is a cast stone of exceptional strength and durability. It is not offered as a cheap substitute for stone or other materials, but as a material having its own artistic expression and individual characteristics, making it adaptable for either trim in conjunction with brickwork or for entire buildings.

Pre-cast Stone readily lends itself to the moulding of intricate shapes and ornamental details; and further, there are endless possibilities of adding colour to architectural design by the use of various coloured aggregates and cements.

In addition to its very important use as a building stone and architectural ornament, it is a most popular material for the reproduction of garden furniture: sundials, garden seats, gazing globes, lighting standards, pergolas, etc., may be all given a most pleasing appearance in this material. Pre-cast stone can be carved, and has some advantages over natural stone, owing to the absence of flaws, and the uniformity of the material. Our experienced staff of designers are continually evolving new designs, and will gladly co-operate with the architect in the development of his ideas and suggestions.

## Manufacture

A distinguishing feature of the process of manufacture is that the facing of the stone is cast integrally with the backing.

This is done by either of two methods: (1) With a facing material of 3-inch thickness, consisting of the natural stone aggregate crushed to a suitable size and mixed with cement, placed in a mould and filled with a backing of stone chippings and cement; or (2) With the natural stone aggregate cast solid throughout.

Colour is obtained either by the natural colour of the aggregate or by adding coloured cements or pigments.

Where an imitative use of the pre-cast stone is wanted, many forms of dragged, tooled and axed finishings can be obtained when casting in the special moulds. Almost any stone can be matched in colour and texture.

Completion of Quadrangle and Registrar's Office, University of Melbourne, in Pre-cast Stone.

## Erection and Building In

Beyond the considerations of transportation and easy handling, there is no limit regarding size, in which pre-cast stone can be made for structural building purposes. Lifting rings for stones of any weight can be cast simultaneously with the pre-cast stone, eliminating, of course, the labour costs of cutting Lewis holes.

Pre-cast stone can be reinforced, as in the case of reinforced concrete, for such purposes as forming projecting cornices and balconies, door and window lintels, etc. Furthermore, bolts, bars, anchors, etc., can be embedded while casting and left projecting ready for building in or anchoring to brickwork or other masonry backing.



Gazing Globe with Pre-cast Pedestal.

The use of pre-cast stone for stair treads and rises is now a general feature, and unquestionably provides an excellent type of fire-resisting, non-slip construction. The treads and rises can be cast with square or moulded return edges and spandrels, suitable for close and open string staircases respectively.

## Comparative Cost

Apart from the considerable saving effected as already noted when pre-cast stone is used in lieu of ordinary building stone, there should be considered the great increased reduction of cost in repetition work—*particularly mouldings and ornamental work*. With ordinary stone this means the expense of a stone carver working on each individual block, whereas with pre-cast stone the one mould necessary to form one block will produce numerous blocks, each of a uniform and consistent finish without any of the flaws sometimes encountered in stonework. The saving thus effected is therefore of great consequence; it may be from 25 to 50 per cent., depending on the nature of the work involved.

## Co-operation

Picton Hopkins & Son Pty. Ltd. are prepared to assist all architects considering the use of pre-cast stone, in selecting materials best fitted to their requirements, and in making preliminary estimates, sketches and specifications.

Samples of many varieties of finishes will be gladly furnished on request.





# THE AUSTRALIAN CEMENT MANUFACTURERS' ASSOCIATION

STUCCO

21 d

HEAD OFFICE:  
YORKSHIRE HOUSE, SPRING STREET,  
SYDNEY

BRANCH OFFICE:  
TEMPLE COURT, COLLINS STREET,  
MELBOURNE

S.A.A. File No.

[See also Page 8]

## PORTLAND CEMENT STUCCO

### Bases for Portland Cement Stucco

Success in the application of Portland Cement Stucco requires that it be used either (1) as a material that is bonded to and becomes an integral part of the base to which it is applied, such as stucco on masonry, or (2) as a thin reinforced concrete slab anchored to the structure but not itself forming an integral part of the backing. An example of the latter is stucco applied on metal reinforcement over frame structures.

### Monolithic Concrete

Monolithic Concrete Walls that have coarse or roughened surfaces are suitable bases for direct application of Portland Cement Stucco. When the surfaces are not rough enough to provide anchorage, it is necessary to prepare them as follows:—

(1) Old monolithic concrete walls should be roughened with bush-hammers or other special tools, and then washed thoroughly with water to remove all dirt and loose particles.

(2) Acid-washing, using solution of 1 part muriatic acid to 6 parts water, is another method of preparing old concrete surfaces to receive stucco. First the wall should be wetted with water so that the acid will act on the surface only. More than one application of acid may be necessary. After this treatment the wall must be washed thoroughly with water to remove all traces of the acid. If the wall is not roughened sufficiently by the acid it will be necessary to use bush-hammers as mentioned in the preceding paragraph.

(3) New monolithic concrete can be roughened with a heavy wire brush or a special scoring tool if forms are removed early. In such cases care must be taken not to remove forms before the concrete is hard enough to be self-sustaining. Forms for concrete that is to receive stucco should not be given oil coatings, as those are likely to remain in the concrete, interfering with the bond. Oil on the surface of the concrete can be removed by washing with soap and water.

(4) Another method of providing rough surfaces on monolithic concrete is by the use of a special large mesh patented hessian placed on the form faces.

After forms are removed the hessian is stripped off the concrete, leaving a deeply-scored surface.

(5) Monolithic surfaces also can be roughened through the use of special compounds painted on the form faces. These retard hardening of the surface concrete. The desired roughness is secured by brushing off the surface material after forms are removed.

### Metal Reinforcement

Metal reinforcement must be used for stucco applied on wood or steel frame structures, and on masonry structures that do not provide satisfactory bond; for example, on chimneys and disintegrating surfaces, and on old stucco surfaces which are to be refinished. Metal reinforcement also must be employed wherever stucco is to be carried over flashing.

Framed wood structures to receive stucco on metal reinforcement should be well braced and rigid; studs should not be more than 18 inches on centres.

### Suction

Every plasterer knows what suction is. He also knows how difficult it is to describe exactly the degree of suction required for different conditions. There is a certain "feel" that tells him when suction is right. Suction is absolutely necessary where stucco is to be applied directly to masonry or monolithic concrete bases in order to get the proper bond. It is also necessary in the first coat so that succeeding coat will be properly bonded.

Uniform suction is essential in order to obtain uniform colour. If one part of the wall draws more moisture from the freshly applied stucco than another, the finish coat may have a spotted finish appearance. Uniform suction is obtained by dampening, but not soaking, the wall evenly before applying stucco. If the surface becomes dry in spots, these areas should be dampened again to restore uniform suction. Plasterers should work on the shady side of buildings, when possible, as it is difficult to keep walls dampened properly when exposed to the sun. Suction is controlled more easily in the shade.

(Continued on next page)



**Curing**

To develop maximum strength and density in any Portland Cement product it is necessary to cure it properly. This is especially true of Portland Cement stucco, which is really a thin slab of concrete. Each coat should be kept damp continuously for at least two days. Moistening should commence as soon as the stucco has hardened sufficiently not to be injured, applying water in a fine spray. Avoid soaking the wall. Give it only as much water as will be readily absorbed. Prevent excessive evaporation on the sunny or windward sides of the building in hot, dry weather.

After the damp-curing period, each stucco coat should be allowed to dry thoroughly before the next coat is applied. The practice of doubling coats without a two-day moist-curing period followed by a drying interval is not good construction practice.

**Proportions and Mixing**

Measurements of materials must be accurate and all batches proportioned exactly alike. Because variations in the moisture content of the aggregate cause change in volume, due to bulking, aggregate of uniform moisture content should be used throughout the job to ensure accurate measurements.

Materials should be mixed to a uniform colour before water is added, and then wet-mixed to the desired consistency. Thorough mixing is absolutely essential. Hand-mixing is satisfactory if done thoroughly, but machine-mixing usually gives greater uniformity. The mixer should be run at least five minutes after all ingredients are placed in the drum. In the case of hand-mixing, the batch should be well worked back and forth on the mixing board ten to fifteen minutes after the water has been added.

Portland Cement Stucco is not injured by standing 2½ to 3 hours if remixed frequently without adding water. No mortar should be used after it has set up or hardened to such an extent that water must be added to make it workable. Admixtures to hasten set should not be used.

**Flashing**

Flashing, which is vital to permanent construction, must be so designed and placed that water will not get behind the stucco.

**APPLICATION****Base Coats on Metal Lath**

The first coat should be approximately ¾ inch thick and carried the full length of the wall or to natural breaking points like doors or windows. Before the first coat hardens it should be deeply cross-scratched to provide mechanical key for the second coat.

Proportions: 1 part of Portland Cement and 3 parts of clean, sharp sand.

Before starting to apply the second coat, the surface of the first coat should be dampened evenly as described under "Suction." The second coat is approximately ½ inch thick. It should be brought to a true, even surface and then roughened with a wood float to provide bond for the finish coat. The second coat must be damp-cured for at least two days and then allowed to become dry.

Proportion: Same proportion as before. If a plasticity agent is required to increase workability, use hydrated lime in proportion not exceeding 10 lbs. per bag of cement (94 lbs.).

**On Masonry or Monolithic Walls**

One base coat only need be applied, similar to second coat as described above.

Masonry walls on which stucco is to be applied directly should be clean and dry, and before applying the base coat the surface must be dampened evenly to control suction, as essential practice in securing first-class work. The base coat should be trowelled on hard and tight, being forced into surface depressions to obtain a permanent bond.

The first coat should be kept damp for at least two days immediately following its application. It should then be allowed to become thoroughly dry.

**The Finish Coat**

Before starting to apply the finish coat, the base coat should be dampened evenly as described under "Suction." Whenever possible, textures should be applied from top to bottom in one operation to eliminate joining marks. If the finish coat is a property line material, manufacturers' directions for application should be closely followed.

(Continued on next page)



## TEXTURES IN STUCCO

## SPANISH TEXTURE

The stucco is applied in fairly heavy layers when creating this texture. A full trowel of mortar is used for each stroke. Strokes of the trowel are made in all directions, being curved and varied to form rolling ridges and hollows in the finished surface. A trowel with rounded corners is used so that straight-line markings will not appear in the finish.

Best results are secured with a fairly stiff mortar. Uniform dampening of the base coat aids in the spread of the finish, help-



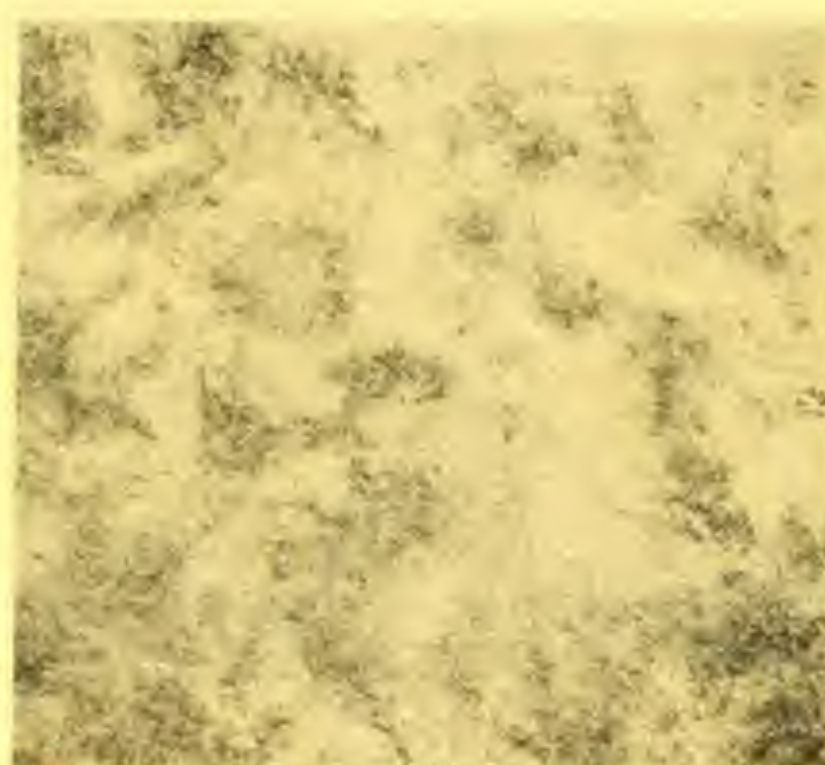
A wavy, trowelled marked finish.

ing to make the mortar stand as placed by the trowel. The wall should not be soaked, however, so that water stands on the surface. Before the mortar hardens to a point where it has lost its workability the rough edges are smoothed out with a round-point trowel. This operation forces projecting sand particles into the mortar, tending to compact the stucco and close the surface pores, yet leaves the wavy effect necessary to a Spanish Texture. Excessive trowelling should be avoided.

## CALIFORNIAN TEXTURE

The mortar for this texture is spread in applications similar to those in creating the Spanish. Full trowels of mortar are spread in all directions and allowed to remain as placed without additional smoothing. There are no straight-line markings, as a rounded trowel is used and curved strokes are employed. Before the mortar hardens, its surface is rubbed down with a wadded piece of hessian to produce a wavy, irregular surface having a coarse texture.

The final treatment consists of trowelling the entire area.



A rubbed trowelled finish.

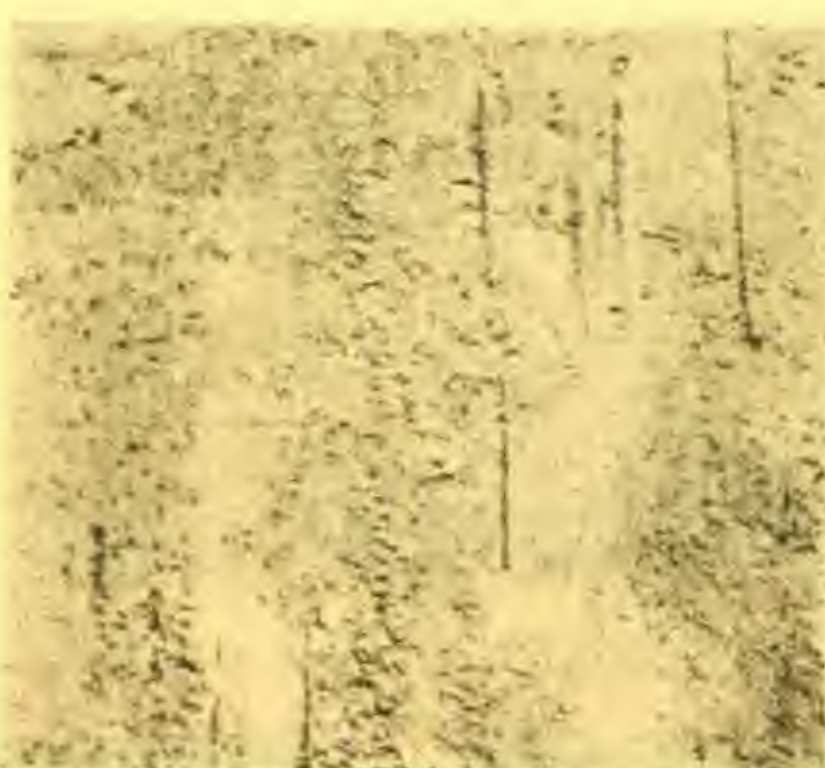
This operation creates highlights throughout the surface. These are in contrast to the relatively coarser texture of the deeper areas. Trowelling also tends to force sand particles into the mortar, compacting the surface.

The finished appearance is shown, an effect like that obtained in plastering over an irregular surface, with the added touch of highlights here and there resulting from the final trowelling.

## MODERN AMERICAN

This rough-torn texture is created by the use of a heavy coat of mortar with its face roughened or torn in a vertical direction.

The mortar is applied approximately  $\frac{1}{2}$ -inch thick, no special effort being made to remove trowel marks. Then the surface is rough-torn by drawing the edge of a wood block up the face of the wall. A downward stroke should never be used in tearing the surface. The block should be tilted at an angle with the wall as it is drawn up. A variety of straight or wavy effects is possible.



A tapestry finish.

To tear the surface lightly, the board may be held in one hand; if a heavier texture is desired, both hands should be used. The different holds on the board and positions best suited to create an evenly-torn surface will come with practice.

This texture can be given an interesting tapestry effect by lightly drawing across its surface a brush dipped in a pigment of different colour than that used in the mortar.

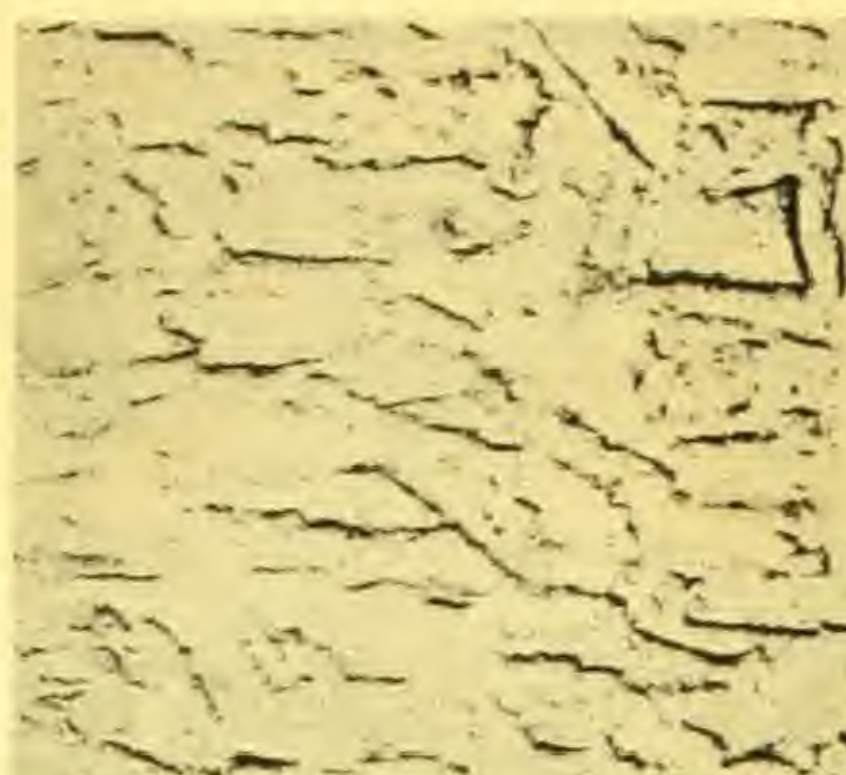
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## ENGLISH COTTAGE

This texture is created by feathering the stucco with the edge of the trowel into irregular wavings and surfaces.

A preliminary coat is applied about  $\frac{1}{2}$ -inch thick. Portions of this coat are left exposed in the finished work, and other portions provide plastic surfaces on which to spread additional mortar used for creating the irregular finish. Small amounts of mortar are then applied with the trowel, using short, twisting strokes at varying



A fine, leaf-like finish.

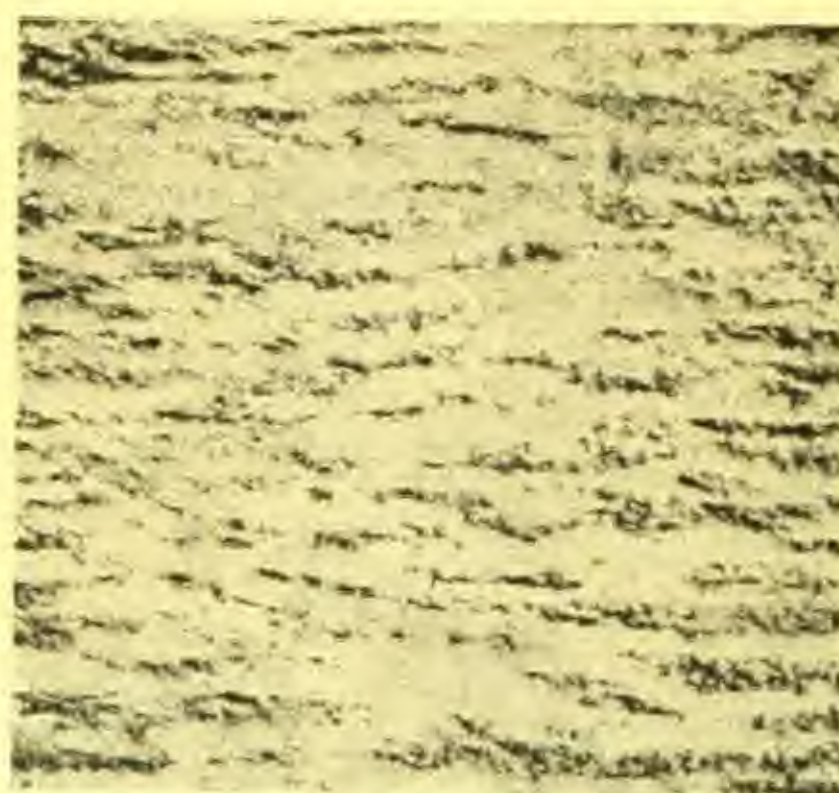
angles to the wall, avoiding vertical, or nearly vertical, strokes. By twisting the trowel as the pat of mortar is applied, slightly curved ridges will be formed.

Variations of this texture are obtained by varying the amount of mortar, the directions and length of travel strokes, and the pressure and twisting motion given the trowel. Heavier applications than those used in illustration are sometimes desirable.

## ITALIAN TRAVERTINE

To create this texture a very thick coating of mortar is applied and then successively stippled and trowelled. To retard hardening sufficiently so that the stucco can be given these surface treatments the base coat must be well dampened just before the finish coat is applied. Wetting reduces the suction and consequently retards hardening.

The finish coat is applied about  $\frac{3}{4}$ -inch thick and trowelled fairly smooth. Then its surface is



A stippled trowelled finish.

stippled deeply, using a whisk broom or wire brush to pull up an irregular texture. The stippling should be irregular in appearance.

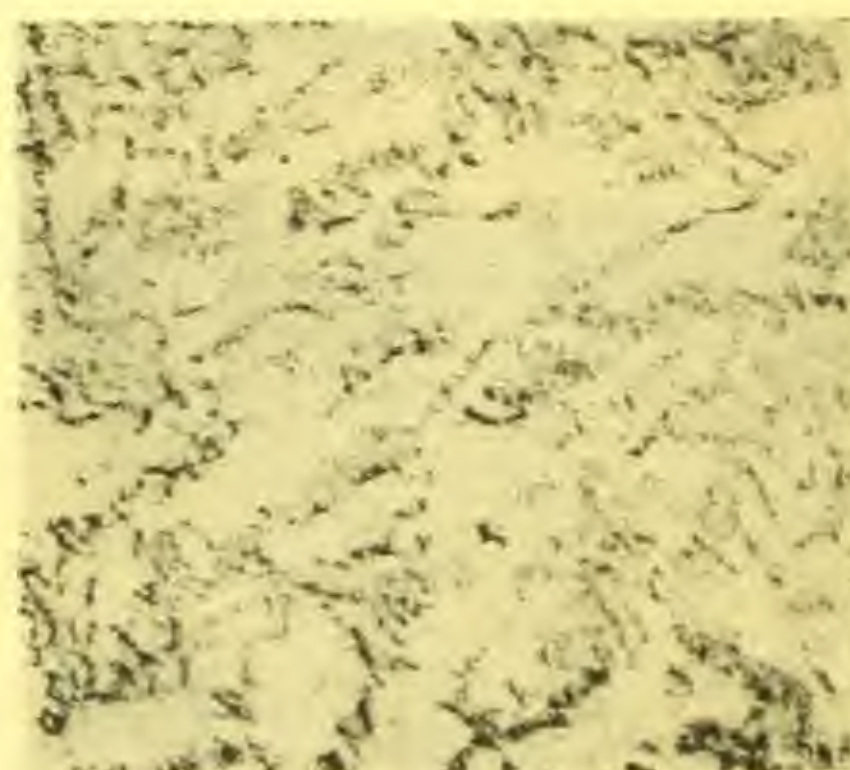
The stippled surface is later trowelled while still workable to smooth out the higher portions. Depressions made by the stippling remain rough and furnish the veined effect. Greater pressure on the trowel will give finer veining.

After trowelling, joints are cut in the surface with the jointing tool.

## ITALIAN TEXTURE

This texture is created with a spatter-dash applied on a thin under-coat. The dash coat is trowelled to give contrasting smooth and rough areas. Polychrome finish can be secured by using differently-coloured mortars in the under-coat and the dash.

A very thin coat is first trowelled on the wall. This insures uniform colour over the entire surface, even though the dash coat may not give complete coverage. Then small quantities of mortar are dashed on with quick strokes of a whisk broom. A bundle of reeds may be used for a slightly different effect. Since a spatter-dash coat hardens rapidly, not more than



A trowelled, spatter-dash finish.

thirty square feet of wall should be covered at a time, and then finished before any hardening occurs.

Finishing is best accomplished by placing the trowel flat against the partially-set dash-coat and drawing it evenly across the face of the wall from left to right. A smoothing return stroke may be made to erase possible trowel marks. Variations will occur in this texture according to the time elapsing between dashing and trowelling. Consequently this time should be constant for uniform appearance. A close-up of the finished appearance is shown.



## SECTION I

[Containing S.A.A. Filing Section No. 25]

## PAINTS









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S.A.A. File No.

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VICTORIA—Hardie Trading Pty. Ltd., 581 Little Collins Street, Melbourne; Hawkes Bros. Pty. Ltd., Clare Street, Geelong.

NEW SOUTH WALES—James Hardie Trading Co. Ltd., 378 Kent St., Sydney; James Sandy & Co. Ltd., 326 George St., Sydney; Bennett & Barkell Ltd., Meagher St., Sydney; Gray, Shedden & Co. Ltd., 19 Merewether St., Newcastle.

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QUEENSLAND—James Hardie Trading Co. Ltd., Perry's Buildings, Elizabeth Street, Brisbane; Jas. D. Sloan & Co., 95 Adelaide Street, Brisbane.

SOUTH AUSTRALIA—Hardie Trading Pty. Ltd., South Road, Mile End South; Thompson & Harvey, 111-117 Flinders St., Adelaide.

TASMANIA—F. H. Stephens Pty. Ltd., 41 St. John St., Launceston; F. H. Stephens Pty. Ltd., Cr. Collins and Argyle Streets, Hobart.



Trade Mark

## PRODUCTS

## CLEAR FURNITURE LACQUERS

also

Sanding Sealers  
Clear Metal Lacquers  
Transparent Coloured Lacquers  
Bronzing Liquids  
Shading Lacquers  
Hardigloss Clear Wood Finish  
Bodying Liquids  
Wood and Metal Undercoats  
Wood Stains and Fillers  
Plastic Wood

## ENAMELS AND VARNISHES

Air Drying and Stoving Varnishes  
Air Drying and Stoving Enamels  
Quick Drying Enamels (Household)  
Quick Drying Enamels (Industrial)  
Tin Plate Varnishes

## LACQUER ENAMELS FOR INDUSTRIAL FINISHING (Gloss and Flat)

also

Hardilac Enamels  
Household Brushing Lacquers  
Flat Wall Lacquers  
Crackle Lacquers  
Priming Oil (For Plaster)

## AUTOMOBILE LACQUERS

also

Pyroxylin Primers and Surfacers  
Oil Primers and Surfacers  
Oil Glazing Putties  
Pyroxylin Putties  
Masking Cream  
Lacquer Thinners and Retarders  
Paint Removers  
Striping Lacquers  
Chassis Black  
Fabric Lacquers  
Aeroplane Dopes and Lacquers



Factory at  
West Footscray,  
Victoria.

## Spartan Lacquers and Enamels

In few other industries have so many changes been wrought in the technique of manufacture as in Lacquers, Enamels, and kindred lines.

The whole production of the above factory is based on the latest methods, machinery, and formulae.

For years past we have maintained an overseas connection which is in constant touch with the latest developments in the field of Lacquer and Varnish and Enamel research carried out in other parts of the world.

The products manufactured at the factory shown on this page are made, as the succeeding pages will show, in a wide range of attractive colours, and a still greater variety can be obtained by a judicious mixing.

With each line advertised in this book will be found appropriate specifications—see page 197.

As the application of lacquers in many directions is comparatively new, the services of experts in each State of the Commonwealth are available to users.

Stocks of all lines are carried throughout the chief centres of Australia.

Spartan Clear Lacquers  
FOR WOOD FINISHING

A complete range of Clear Finishes for Furniture, Cabinet Work, Interior Woodwork, etc., has been perfected under the Spartan Brand.

These finishes, besides Clear Lacquers, ranging from a flat or velvet finish to the most brilliant gloss, include stains, fillers and sealers for all classes of work.

These Clear Lacquers represent the latest development in wood finishing, and in recent years have displaced french polishing for high-grade work. Not only is the cost lower, but the system gives many advantages in appearance and durability.

The Sanding Sealer, which is really a transparent filling material, replaces shellac and is much superior in its adhesive qualities, forming the ideal bond between the wood and lacquer.

These Clear Lacquers, unlike french polish, will not easily show scratches or the result of rough wear generally.

Spartan Wood Stains are made in blackwood, mahogany, walnut, rosewood, light and dark oak, and Jacobean. They have remarkable penetration, so are not susceptible to rubbing off in the application of the filler. They are unusually free from bleeding, and at the same time are as permanent as it is possible to manufacture wood stains. They do not raise the grain, and dry very rapidly.

FILLERS.—These heavy paste fillers have proved the most economical line on the market, because they do not embody barytes and such like heavy loading materials; the result is that a given weight of Spartan Filler will cover a much

(Continued on next page)



## SPARTAN INDUSTRIAL LACQUERS



1055—CREAM



10111—DUCK EGG GREEN



1039—BUFF



10015—PEARL GREY



1059—MEDIUM YELLOW



1012—JADE GREEN



10311—MEDIUM BROWN



1001—DOVE GREY



10910—MANDARIN RED



1016—EMERALD



10312—CHOCOLATE



1042—PALE BLUE



1098—VERMILION



1019—CHROME GREEN



10113—OLIVE GREEN



10412—CHINESE BLUE



1096—CHERRY RED

GOLD BRONZE  
in Bronzing Liquid 11245

1054—DEEP ORANGE



1041—ROYAL BLUE

ALSO 1051—GLOSS BLACK; 1064—FLAT BLACK; 1044—GLOSS WHITE; 1326—GROUND WHITE

(Continued on next page)



**Spartan Clear Lacquers (Cont.)****WOOD FINISHING**

greater area of surface than any line embodying the above-mentioned material.

They are exceedingly fine in texture and accordingly call for a minimum of sanding before the application of the sealer coat.

**TYPICAL FINISHING SCHEDULES**

FOR ARCHITECTURAL WOODWORK, FURNITURE, ETC.

**High Grade Gloss or Piano Finish**

Stain with Spartan Wood Stain to the desired colour; fill with Spartan Wood Filler, supplied in pulp form and to be thinned as necessary with Spartan Mineral Turps; dry six hours; sand lightly. Spray two coats Spartan Sanding Sealer 1364, allowing 30 minutes between coats; dry three hours or over night if possible; dry sand to a perfect surface. Spray two coats Spartan Clear Gloss 1128, thinned one part of lacquer to two of Spartan Thinner 236; dry over night; pull over to piano finish with Spartan Bodying Liquid 320.

**High Grade Flat or Velvet Finishes**

Stain with Spartan Wood Stain to the desired colour; fill with Spartan Wood Filler, supplied in pulp form and to be thinned as necessary with Spartan Mineral Turps; dry six hours; sand lightly. Spray two coats Spartan Sanding Sealer 1364, allowing 30 minutes between coats; dry three hours or over night if possible; dry sand to a perfect surface. Spray two coats Spartan 1156 (for Flat) or 1107 (for velvet finish) thinned one part of lacquer to two of Spartan Thinner 236.

Semi-Gloss Finishes are obtained by mixing Spartan Clear Gloss 1128 with the Flat Lacquer, according to the lustre required.

**Full Gloss for Cheaper Work**

Stain with Spartan Wood Stain to the desired colour; fill with Spartan Wood Filler, supplied in pulp form and to be thinned as necessary with Spartan Mineral Turps; dry six hours; sand lightly. Spray one coat Spartan Sanding Sealer 1364, allow to dry three hours or over-night if possible; dry sand to a perfect surface. Spray two coats Spartan Clear Gloss 1101, thinned one part Lacquer to one part Spartan Thinner 236; dry over night; pull over to high gloss with Spartan Bodying Liquid 320.

**Flat Finish for Cheaper Work**

Stain with Spartan Wood Stain to the desired colour; fill with Spartan Wood Filler, supplied in pulp form and to be thinned as necessary with Spartan Mineral Turps; dry six hours; sand lightly. Spray one coat Spartan Sanding Sealer 1364, allow to dry three hours or over-night if possible; dry sand to a perfect surface. Spray two coats Spartan 1113, thinned one part Lacquer to one part Spartan Thinner 236.

**WOOD AND METAL FINISHING IN INDUSTRIAL LACQUERS****TYPICAL SCHEDULES****Wood Finishing**

After sanding, apply one or more coats of Spartan White-wood Undercoat 1307, depending on the condition of the surface. Allow to dry for two hours or longer if possible, and dry sand. Apply two coats Spartan Industrial Lacquer of the desired colour thinned with equal volume of Spartan Thinner 236 or 244. The result is a full gloss finish, but if desired a semi-flat or flat finish can be obtained by replacing the Spartan Industrial Lacquers with our Flat or Eggshell Lacquers, which are made in any of the colours shown on page 196.

**Metal Finishing**

Clean surface with Spartan Cleaning Solvent 663 and fill as necessary with Spartan Oil Glazing Putty 4328. Allow to dry for six hours, and apply one or more light coats of lacquer Primer Surfacer 1301 (white) or 1303 (grey).

Allow to dry for one hour and sand, using petrol as a lubricant. Apply two coats of Spartan Industrial Lacquer of the desired colour.

N.B.—It should be carefully noted that where such metal work is exposed to the weather, Industrial Lacquers which are susceptible to the rays of the sun should not be used. The only line suitable is Spartan Automobile Lacquer.

**Plaster Walls**

Remove any old finish which shows lack of adhesion, and apply a very light coat of Spartan Priming Oil 4305; allow to dry over night, and apply one or more coats as necessary of Spartan Flat Wall Lacquer. This schedule gives a flat washable finish, specially suitable for hospital wards, kitchens and the like. Spartan Industrial Lacquer will give a gloss finish.

**Bronze Finishes**

For best results apply one or two coats of Spartan Lacquer Primer Surfacer 1303, allow to dry for one hour and finish with one coat Spartan Bronzing Liquid 11245, to which is added the Bronze Powder of the desired colour. Then apply one coat of Spartan Bronzing Liquid 11245 Clear.

This Bronzing Liquid is so designed that under normal conditions the Bronze Powder will not cause the liquid to thicken or "jell" after making up.

**SPARTAN INDUSTRIAL ENAMEL****QUICK DRYING**

This is a line developed quite recently from synthetic resins in combination with special varnish oils, producing an enamel which is extremely hard and durable as well as quick drying. These enamels are so designed that they will spray, brush, or dip with equally good results, while they may be used for either inside or outside purposes, and on both wood and metal. They will be found in practice to give very good results as a floor finish. For spraying it is recommended that they should be thinned with mineral turpentine, two parts of enamel to one of the thinning agent. For brushing no addition of the Thinner is necessary, as they are made ready for use. They will flow easily and level out to a glass-like finish free from brush marks. For dipping, the line is used as made, and will give an extraordinarily high gloss.

(Continued on next page)



## Recommendations for Painting Interiors of Homes

Surface to be Treated	Materials Recommended	Technical Information			Efficiency Information
		Thinner	Proportion	Spreading Capacity per Gall.	
<b>HALLS and VESTIBULES</b>	Tex or Flat-Tone (see below)	Cold Water	Thin to a creamy consistency		An easy-working texture finish. See Tex booklet for suggested designs. (Sent on request.)
<b>DRAWING, DINING, BEDROOMS and LOUNGE</b>	Flat-Tone or Tex (see above)	Raw Linseed Oil and Pure Turpentine	Supplied in liquid form. Add Thinners as per instructions on Colour Card	700/750 sq. ft.	A particularly restful, eggshell flat paint that is washable. Use Flat-Tone Primer on unpainted walls.
<b>FIBRO-CEMENT, ANNEXE or BREAKFAST ROOM</b>	Kiandra Cold Water Paint or Flat-Tone (see above)	Cold Water	Thin to creamy, easy-brushing consistency	750/850 sq. yds. per cwt.	Obtainable in white and popular shades.
<b>KITCHEN</b>	Enamelastic Enamel	Pure Turpentine	Ready for use, but add Turpentine if necessary	600/750 sq. ft.	Enamelastic is strongly recommended for walls and kitchen equipment on account of its heat and steam-resisting qualities. Apply one or two coats Enamelastic Undercoating and finish with Enamelastic as directed.
<b>BATHROOM</b>	Enamelastic Enamel	(see above)			
<b>LAUNDRY</b>	Rockgloss (Leadless Paint) or Kiandra Cold Water Paint	Pure Turpentine	Ready for use, but add Turpentine if necessary	700/750 sq. ft.	Rockgloss is offered in all popular shades and is quite suitable for this particular work.
<b>WOODWORK, SKIRTINGS, Etc.</b>	Flat Oil Stain and Eggshell Flat (Velvet Finish) or Finest Oak Varnish	Pure Turpentine if necessary Do not add Thinner Pure Turpentine	(see above) Ready for use Stir vigorously if thick Sufficient to ensure free working	750/850 sq. yds. per cwt. 500/600 sq. ft. 600 sq. ft. 600/650 sq. ft.	On Concrete, Cement, or Fibro Walls use "Prymseal" (Cement Sealer) as a priming coat for Kiandra Cold Water Paint, or other succeeding coats of paint as selected. Flat Oil Stain provides a pleasing finish, but may be treated with Flat or Gloss Varnish if desired.



# Recommendations for Painting Interiors of Hotels, Hospitals, Factories, Etc.

Surface to be Treated	Materials Recommended	Technical Information			Efficiency Information
		Thinner	Proportion	Spreading Capacity per Gall.	
WALLS and CEILINGS—Plaster " (walls) Fibro-Cement Factory and Warehouse Walls	Flat-Tone or	Raw Linseed Oil and Pure Turpentine	Supplied in liquid form. Add Thinners as instructed on Colour Card	700/750 sq. ft.	A particularly restful, eggshell, flat oil paint that is washable. Use Flat-Tone Primer on unpainted walls.
	Tex or	Cold Water	Thin to creamy consistency		An easy-working texture finish which does not crack or crumble. See Tex booklet for suggested designs. (Sent on request.)
	Kiandra Cold Water Paint	Cold Water	Thin to creamy, easy-brushing consistency	750/850 sq. yds. per cwt.	Covers solidly with an intense white of great permanency. Kiandra is quite suitable for plain white ceiling work.
	Factory White	Raw Linseed Oil and Turpentine	Ready for use, but thin with equal quantities of Oil and Turps for undercoat	800 sq. ft.	Factory White finishes with a permanent egg-shell gloss which guarantees maximum light-diffusion without glare.
OPERATING THEATRES, BATH-ROOMS, DOORS and WOODWORK, WARDS, KITCHENS, Etc.	Enamelastic Enamel	Pure Turpentine	Sufficient Turpentine to ensure ease of working	600/675 sq. ft.	Enamelastic is heat, steam and water resisting. Apply one or two coats Enamelastic Undercoating and finish as directed on can.
	Rogers Brushing Lacquer or Opex Spraying Industrial Lacquer or Silverglo	Rogers or Opex Thinner as directed	Rogers Brushing Lacquer is ready for use, but Opex must be reduced as instructed		Rogers Brushing Lacquer is recommended where a spray plant is not available. The employment of a spray painter using Opex would prove an economy.
		Ready for use, but thin with Turps. if necessary	Very little required	900/1,000 sq. ft.	An excellent rust preventive. Stir contents thoroughly and often, then pour into a shallow vessel, from which it should be used.
WOODWORK—Doors, Picture Rails, Cover Batons, etc.	Flat Oil Stain with	Ready for use	Add Turps if necessary to thin brushing consistency	500/600 sq. ft.	A pleasing, natural wood finish, which may be varnished, polished or lacquered as desired.
	Velvet Finish Varnish	Do not thin	Stir quickly	700 sq. ft.	Waterproof; will not spot white or rub to a glossy surface through wear. Represents a genuine dull rubbed effect.
	Scarnot Varnish	Pure Turpentine if necessary	Ready for use	600 sq. ft.	A very durable Varnish that is unaffected by ether, boiling water or alcohol.
Hotel Bars, Counters and Woodwork Floor Surrounds	Floorlac	Turpentine	Ready for use	500/600 sq. ft.	A hard-wearing combination Stain and Varnish.
	Waggon and Implement Paint	Turpentine	Ready for use	600/675 sq. ft.	Supplied in popular colours suitable for pipe lines.



# ARCHITECTS' GUIDE

FOR PAINTING, VARNISHING, STAINING AND ENAMELLING

**IMPORTANT**—Each of the Products mentioned below bears the Berger Name and Trade Mark

SURFACE	TO PAINT Use Product Named Below.	TO ENAMEL Use Product Named Below.	TO STAIN Use Product Named Below.	TO VARNISH Use Product Named Below.
BRICK WALLS (Exterior)	Prime with "Dusseal" Finish with "B.P." or Cement and Waterproof Paint			Weatherol (Clear, waterproofing) Cannot be painted over
CONCRETE WALLS (Exterior)	Prime with "Dusseal" Finish with Cement and Waterproof Paint			
CEMENT FLOORS	Prime with "Dusseal" Finish with Floor and Paving Paint		Lime-Proof Colours mixed with Cement	
EXTERIOR WOOD SURFACES	"B.P." Berger's Paint (Prepared)	Enamelac (White) or Palladium	Flat Oil Stain and Varnish, or Arboreum Wood Preservative—Brown	M.P. Copal or Fine Outside Oak
EXTERIOR METAL SURFACES	"B.P." Silverglo, Anti-Corrosive Paint or Ebonite	Palladium		M.P. Copal, Fine Outside Oak or Waggon
FACTORY WALLS (Interior)	"B.P." Matone, "F.O.B." Cold Water Paint or Factory White	Varnol or Palladium		Fine Inside Oak or Nevamar
FLOORS (Interior Wood)	Floor and Paving Paint		Flat Oil Stain	Varnish Stain or Special Floor Varnish
GALVANISED IRON SURFACES	Prime with Galvan- ised Iron Primer. Finish with Struc- tural and Roof Paint			
INTERIOR WALLS AND CEILINGS	Matone or "F.O.B." Cold Water Paint	Enamelac (White) Palla- dium or Opex Lacquers		
INTERIOR WOOD TRIM	"B.P." Berger's Paint (Prepared)	Enamelac (White) Palladium or Opex Lacquers	Flat Oil Stain	Fine Inside Oak or Nevamar
PORCH FLOORS	Floor and Paving Paint		Flat Oil Stain	Special Floor Varnish
RADIATORS AND PIPES	Silverglo	Heat-resisting Enamels or Opex Lacquers		Heat-Resisting Varnishes
ROOFS (Metal)	Structural and Roof Paint, Anti-Corro- sive Paint or Silverglo			
ROOFS (Wood Shingle)	"B.P."		Arboreum Wood Preservative-Brown	
STACKS AND HOT SURFACES	Silverglo or Smoke Stack Black			
STRUCTURAL STEEL	Prime with Ledquid (Liquid Red Lead) Finish with Structural and Roof Paint or Anti-Corrosive Paint			
TO DAMP-PROOF FOUNDATIONS	Asphaltum Black or Ebonite			
TO DAMP-PROOF WALLS	Damp Resister			
WOOD PRESERVATIVE			Arboreum Wood Preservative-Brown	Weatherboard Oil



## FOREWORD TO SPECIFICATIONS

The specifications contained in the following pages should cover the application of paints, enamels, varnishes, stains, and so forth, on every surface. In the event of a finish of special nature being required, however, the Berger Department of Architectural Service is at the disposal of the Profession, and no obligation is imposed for reference to it.

The Department is composed of experts who have spent years in research work and actual painting experience, so that advice rendered may be thoroughly relied upon to be correct and dependable.

In almost every case the subject matter on the following pages has been divided into two parts—one the "Discussion," which describes the finish to be used, and the other the "Specification," relating to application.



SYDNEY HARBOUR BRIDGE

60,000 gallons of Berger's Paint (approximately 600 tons) will be used to protect this huge structure against the elements of decay. The finishing coat was prepared to specifications supplied by Dr. J. J. C. Bradfield, M.E., M.Inst.C.E., Chief Engineer to N.S.W. Government.

## PAINTING OF EXTERIOR SURFACES

## DISCUSSION:

"B.P." Berger's Paint (Prepared) is a carefully manufactured ready-to-use Paint, designed for inside and outside painting of all kinds of buildings. It is the best paint we can make or money can buy. It is made in 44 shades, black and white, to exact and unvarying formulae from guaranteed pure pigments—Genuine White Lead (Carbonate) and Pure Oxide of Zinc—with fine Berger Colours for tinting, ground and mixed with Genuine Linseed Oil and Pure Turpentine. It is ground to extreme fineness, and thoroughly incorporated by powerful machinery. In the production of dark or pigmented colours a small quantity of a high-grade exterior Varnish is added to preserve the gloss. The result is a clear-toned Paint that spreads farther, looks better and wears longer than any Paint which can possibly be made in a small mill or mixed by hand. It is well known that a lead and oil paint will powder and chalk, lose its lustre and wash off after exposure to the weather for a time. We have found that by adding a correct proportion of oxide of zinc to the lead this defect is remedied, because the combination gives a harder, more durable paint film. Such a paint is of better colour, since zinc is whiter than lead, will retain its lustre longer, and will cover more surface than lead and oil alone. In fact, a correct combination of lead and zinc gives the ideal paint pigment—and that is what "B.P." is. See page 4 for part colour range.

**Packages.**—"B.P." is supplied in tins of 1-gallon, ½-gallon, quart, pint and ½-pint respectively; also in 5-gallon iron drums. All Imperial measure.

**Covering Capacity.**—One gallon of "B.P." properly worked out under the brush will cover 850 or more square feet (one coat) according to the condition of the surface to be painted.

**Stir Well.**—One cannot overrate the importance of stirring the Paint before use. No matter how well

ground, portions of the pigments will settle in the tin, and these need to be lifted to the top and evenly mixed with the liquid. Best results are secured by pouring off a quantity of the liquid and stirring the remaining contents thoroughly, returning the liquid gradually until the whole is poured back into the original package. The paint will then be of even consistency throughout. "B.P." is ground to the correct consistency for all classes of work, but for Undercoats the following directions should be followed:—

## SPECIFICATION:

**New Work** should be thoroughly primed with "B.P." Primer (Pink); in the absence of this, the selected colour could be used, but thinned with Genuine Raw Linseed Oil, unless the surface is hard and non-porous, in which case Turpentine only should be added.

**Second Coat.**—Thin with Pure Turpentine in the proportion of one pint to a gallon of "B.P." This will assist to deaden the gloss, and so give a good surface for the third or finishing coat, when "B.P." must be used as it comes from the tin. If necessary, in cold or damp weather, a small quantity of Terebine or Linseed Oil can be added, say ¼-pint and 1-pint respectively to a gallon of Paint. "B.P." is an Oil Paint, and Varnish should not be used.

**Old Work.**—All old paint should be thoroughly scraped or burned, according to its condition, securing in the first place a good, even surface on which to work. If the timber is very porous and spongy, add one pint of Linseed Oil to every gallon of Paint, but if the timber is hard and smooth, use a similar quantity of Turpentine.

**Important.**—Do not attempt to paint on damp wood or in damp weather. Timber absorbs moisture and it must get out, mostly in the form of blisters.

**Note.**—On surfaces where the finishing colour is to be a dark brown, dark green, or dark red, for best results use a suitable ground coat such as "B.P." 145 thinned with Pure Turpentine.

(Continued on next page)



# Berger's Paint

## (PREPARED)

Each shade made to a proven formula from Genuine White Lead, Genuine Zinc Oxide, Pure Linseed Oil, Pure Turpentine and finest dry colours.

Famous for its easy working qualities and thorough amalgamation of liquid and pigment.



LIGHT STONE



SAGE GREEN



DEEP BLUE



MID. STONE



MAROON



DEEP STONE



DRAB



MAIL RED



DARK TAN



FRENCH GREY



DEEP GREEN



WARM STONE



PALE BLUE



IVORY



EAU DE NIL



NAVY GREEN



CREAM



CHOCOLATE



LIGHT GREEN



DEEP BUFF



RICH BROWN

Also obtainable in Gloss White, Heavy Body White, Flat White and Black (No. 153)

PLEASE DO NOT DETACH COLOUR SAMPLES.

COMPLETE COLOUR CARDS (44 shades) SENT ON REQUEST



## PAINTING OF EXTERIOR SURFACES (Continued)

## WHITE LEAD

In all specifications of White Lead specify Berger's Genuine Australian Stack-made White Lead. This is a strictly pure white lead (lead carbonate) and is ground in highly refined linseed oil. Berger's White Lead is

extremely fine and very white. It has texture, body, reducing qualities, opacity, covering power and easy working qualities. Proper maturity plays a most important role in the success of this product.

## CONCRETE, CEMENT AND STUCCO WALLS (TO PAINT)

## DISCUSSION:

The architect appreciates the advisability of painting exterior concrete or stucco walls. This is advisable for two reasons: first, the control of the decorative effect in colour, as required by the type of building, which paint affords, and the ease in which the building can be cleaned up in appearance and the change of colour scheme effected. Second, painting a concrete wall renders it water-tight, and prevents the appearance of hair-line cracks and chipping off caused by the penetration of moisture and frost. Berger's Cement and Waterproof Paint is an oil paint designed for outside exposure, but which dries to a dull, velvety finish without gloss. It does not destroy the interesting texture of the stucco

wall as does a gloss finish, but retains the effect for which stucco is specified. See page 8 for colour range.

## SPECIFICATION:

All exterior wall surfaces should receive one coat of Berger's Dusseal (Cement Sealer) before any attempt is made to apply the paint. This will thoroughly seal the surface against moisture and the paint against the action of the alkali present. The first coat of Berger's Cement and Waterproof Paint should be thinned with pure Turpentine to a working consistency. Allow at least 48 hours to dry, after which the second coat, thinned with equal quantities of pure Turpentine and raw Linseed Oil, if necessary, should be applied.

## CEMENT PATHS AND FLOORS (TO PAINT)

## DISCUSSION:

Cement or concrete garden paths, garage and engine-room floors, floors in public institutions, manufacturing plants, railway cars, and on steamship decks, and other similar surfaces that are required to be painted, should be finished with Berger's Floor and Paving Paint. This highly satisfactory paint is made (in nine shades, black and ivory) of highest grade pigments combined with hard-wearing elastic floor varnish. It covers well and flows out with a tile-like surface, has a good gloss, and does not chip or mar. It is washable with hot or cold water, is sanitary, not affected by dampness, and keeps down the dust. Berger's Floor and Paving Paint is not affected by oils, grease, benzine, kerosene, or solvents, so that it may also be recommended for power-houses.

## SPECIFICATION:

The surface to be painted should be thoroughly dry and free from dust, dirt and grease. For the very best results the cement should be allowed to "weather," thus enabling the first coat of Berger's Floor and Paving Paint to penetrate the cement. No reduction in the paint is necessary, and a second coat should be applied after the first has been allowed to dry out. If it is required to paint new cement, however, first apply a coat of Berger's Dusseal (Cement Sealer). This will form a foundation which acts as an effective preservative against the ever-present alkali in cement. When thoroughly dry, apply two coats of Floor and Paving Paint direct from the can.

## IRONWORK AND METAL SURFACES (TO PAINT)

## DISCUSSION:

Proper protection of metal from rust is only secured by care in preparing the surface for the paint, because no paint, however good it may be, can overcome the difficulties imposed upon it by a bad surface. The first essential is to thoroughly clean the surface and free it from all mill scale, rust, dirt and grease. This may be accomplished by use of wire brushes, by sand-blasting or by other similar methods. The oxide in corroded parts should be converted by being subjected to the flame of a torch, and after cleaning in this manner, the work should be immediately given a priming coat of Berger's Ledquid.

The contractor should inspect the surface to be painted before the priming coat is applied to make sure that all rust, mill-scale, grease and foreign matter have been completely removed. Paint should not be applied on any wet or damp surface.

## SPECIFICATION:

First Coat—Berger's Ledquid (Liquid Red Lead). All riveted and bolted connections and parts inaccessible after construction to have two coats. Second coat—Berger's Structural and Roof Paint or Berger's Heavy-Bodied Anti-Corrosive Paint (Red or Grey).

## PAINTING GALVANISED SURFACES

It is often the case that the surface of galvanised iron retains traces of waste acid as a result of the galvanising process. These acids invariably attack the paint film and consequently new iron should never be painted without having a first coat of Berger's Galvanised Iron Primer.

NOTE.—Berger recommends for metal protection are Berger's Concentrated Anti-Corrosive and Berger's Structural and Roof Paints. These two finishes will give better protective value and more general satisfaction than anything else that can be used. It is realised, however, that opinions may differ to a certain extent and, therefore, other finishes are listed below to meet a very existent demand.

**BERGER'S GALVANISED IRON PRIMER.**—To neutralise the acid on galvanised iron and to form a bond between the iron and the finishing coat.

**BERGER'S LEDQUID (Liquid Red Lead).**—A scientific blending of special non-setting Red Lead and treated oil to give a perfect result wherever Red Lead could be used. These are thoroughly amalgamated with a combination of liquids to a unique Berger formula designed for keeping the pigment always in suspension so that every drop is usable. Ledquid covers more solidly than hand-mixed lead, and its finish is much smoother owing to its fine grinding.

**Ledquid Specification.**—Stir Ledquid thoroughly before use, lifting the paint from the bottom of the drum. Rolling and shaking the drum are also recommended. A good way to stir is as follows:—

- Pour off half the contents of the drum.
- Mix the remainder.
- Pour back.
- Stir the whole contents thoroughly.

When applying Ledquid on bare iron, or when it is to be followed by another coat of paint, thin with turpentine—about one pint to the gallon or, on an average, half a gallon to each

5-gallon drum. Do not add Linseed Oil to Ledquid when using it as an Undercoating or Priming Paint. Allow Ledquid at least 24 hours to dry before painting over it. If you can allow longer, it has a better chance to harden off, and results will be even better. When using two coats of Ledquid that are to be painted over, thin the first coat with half a gallon of turps to each 5-gallon drum and second coat with quarter of a gallon of turps to each 5-gallon drum. When Ledquid is the final coat of paint it should be used as it comes from the drum, after stirring.

**BERGER'S CONCENTRATED ANTI-CORROSIVE PAINT.**—Made from extra high-grade Oxide and pure Linseed Oil, specially treated in the Berger factory at Rhodes. The elasticity of this paint is remarkable, and it is so concentrated that it is capable of great reduction, thus making it the most economical finish to use.

**BERGER'S STRUCTURAL AND ROOF PAINT.**—Ready for use, works easily under the brush and has good covering capacity. Excellent for roofs, gutterings, down-pipes and general metal surfaces.

**BERGER'S EBONITE (Bitumen Base).**—A special composition that is proof against the variations in temperature or weak acid fumes. It is especially recommended for any under-water work.

**BERGER'S SILVERGLO.**—Unsurpassed as a silver finish for radiators, water boilers, power-house boiler casings, structural iron work, rough timber, gas, steam and water pipes. Silverglo reflects the rays of the sun, thus making a considerable saving in evaporation when used on water tanks and reservoirs containing volatile liquids. Because of its reflective quality it reduces inside temperature by at least 12 degrees, making it ideal for use on iron roofs. It has been used on Queensland roofs with remarkable success.

(Continued on next page)



# Berger's MATONE

## The Flat Oil Paint for Interior Decoration!

Matone gives a beautiful, flat finish that diffuses light. It is washable with soap and water and does not collect dust.



CREAM



FRENCH GREY

JADE  
SEA GREEN

MAIZE



PUTTY

LAVENDER  
OLD ROSE

CHAMPAGNE



NILE GREEN

JONQUIL  
MYRTLE GREEN

MORNING BLUE



CERULEAN BLUE

MOROCCO  
PEWTER GREY

PINK



COCOANUT

SUN TAN  
WEDGEWOOD

OYSTER GREY



TURQUOISE



MERCURY RED



BATH STONE



LIGHT BLUE

TERRA COTTA  
(LIGHT)

ALSO MADE IN WHITE

PLEASE DO NOT DETACH COLOUR SAMPLES.  
RAMSAY'S CATALOGUE

COMPLETE COLOUR CARDS SENT ON REQUEST.

BERGER — PAGE SIX

(Continued on next page)



## PAINTING OF INTERIOR SURFACES

## INTERIOR WALLS (TO PAINT AND ENAMEL)

**Berger's KALSOMINE.**

**New Plaster.**—Finish one or two coats Berger's Kalsomine mixed with cold water.

**Old Plaster.**—Finish one or two coats Berger's Kalsomine mixed with cold water.

**Previously Coated Surfaces.**—Scrape off all old coating that is loose; size or wash down; finish one or two coats Berger's Kalsomine mixed with cold water.

**Berger's MATONE (Washable Flat Oil Wall Paint).**

**For Timber Lining and Weatherboards.**—First coat: Add one pint of Genuine Raw Linseed Oil to one gallon of Matone. Apply a good even coat and allow 24 hours to dry thoroughly. Second coat: Half-pint of Genuine Linseed Oil and half-pint of Turpentine to one gallon of Matone. Third coat: Reduce if necessary with a slight addition of Spirits of Turpentine. Not more than half-pint of Turpentine to one gallon of Matone.

**For Plaster, Cement, Concrete and Asbestos Sheets.**—Where cement, concrete or asbestos sheets are new, one coat of Berger's Dusseal (Cement Sealer) should be first applied, then apply two coats as second and third outlined above.

**Metal Ceilings.**—For the first coat add Raw Linseed Oil in the proportion of half-pint to one gallon of Matone. The second coat to be reduced, if necessary, with Pure Spirits of Turpentine only.

**For Old Work and Renovations.**—These surfaces require careful treatment in order to neutralise the unevenness of repaired surfaces, stopping, etc. Repaired patches in cement or concrete should be first sealed with Berger's Dusseal. Then follow with second and third coats outlined above. Old painted timber surfaces should be made clean and are then ready for

the second and third coats set out above. If a light colour is to be put over a dark surface it may be necessary to apply a further finishing coat, making three coats of Matone in all.

**NOTE.**—Matone should not be brushed out too thinly, but flowed and allowed to "matt" up. Its working properties are similar to an ordinary gloss enamel, but it dries with a flat surface. Use a wide wall brush and flow on evenly with a sweeping stroke. See page 6 for part colour range.

**IMPORTANT.**—Stir thoroughly. Replace the cover on tin when not in use.

**Berger's "F.O.B." (Flat Oil Bound) COLD WATER PAINT.**

**New Plaster.**—Apply good coat Berger's Dusseal; finish one or two coats "F.O.B." thinned with cold water.

**Old Plaster.**—Finish one or two coats "F.O.B." thinned with cold water.

**Previously Coated Surfaces.**—Scrape off all old coating that is loose; size or wash down; finish one or two coats "F.O.B." thinned with cold water.

**OIL GLOSS OR VARNISH GLOSS PAINT FINISH.**

**New Plaster.**—Apply one good coat Berger's Dusseal; then one coat of "B.P." Berger's Paint (Prepared) in the shade desired, with enough turpentine added to deaden the gloss. Finish with one coat "B.P." as it comes from the can.

**Old Plaster.**—Finish as for new plaster, or with three coats of "B.P." Berger's Paint (Prepared).

**Previously Coated Surfaces.**—Scrape off all old coating that is loose; wash down; finish as for new plaster with exception of Berger's Dusseal, or with two coats of "B.P." Berger's Paint (Prepared).

**BERGER'S ENAMELAC (WHITE ONLY)****ON NEW INTERIOR WOODWORK****DISCUSSION:**

It is impossible to obtain an Enamel of better quality than Berger's Enamelac or one which will give more satisfactory results wherever the most perfect white enamel finish, interior or exterior, is desired. The points of particular advantage that are claimed for Enamelac are perfect flowing qualities, great opacity or hiding power, firmness and elasticity, and the permanence of its whiteness. The most important feature in connection with enamel work is the building up of the undercoat or undercoats. Each coat of Enamelac Undercoating, except the last, should be carefully sanded to a smooth surface, preferably with No. 1/0 Wet-or-Dry Sandpaper, and great care should be taken to see that the work is not sanded too coarsely,

as even a very fine scratch is noticeable in subsequent enamel coats in high-class work. After undercoating, the enamel may then be flowed on as specified below.

**SPECIFICATION:**

**Preparation.**—Before proceeding with the work, make sure that the surface to be finished is perfectly dry and free from dust and dirt. **First Coat:** Apply one coat of Lead Primer. **Second and Third Coats:** Berger's Undercoating White Enamel in the consistency supplied by the manufacturer. When dry, sand with No. 1/0 Wet-or-Dry Sandpaper. **Finishing Coat:** Berger's Enamelac applied in the consistency supplied by the manufacturer.

**BERGER'S PALLADIUM ENAMEL****FOR WALLS AND WOODWORK****DISCUSSION:**

Berger's Palladium Enamel is particularly suitable for use in Butter Factories, Dairies, Breweries, Hospitals, Kitchens, Schools, and in fact, wherever hygiene and cleanliness are essential factors. It flows under the brush, is easy to work, and dries in from 10 to 12 hours. When dry, Palladium possesses a hard porcelain-like finish that is exceptional in gloss and colour-retention qualities. It will withstand extremes of heat and cold, brine, steam and grease without discolouration, and may be readily washed without impairing its surface in any way. Berger's Palladium is absolutely non-injurious, and that is an important consideration when choosing an enamel for any location where foodstuffs are likely to be brought into contact with the finish. It may be applied over practically any wood, iron, brick or cement surface. Before using Palladium on New Cement, particular care should be exercised to see that the surface is first sealed with Berger's Dusseal (Cement Sealer). For best results Palladium Undercoating White should be used as a ground coat for Palladium White; for the colours, the Specially Prepared Undercoats are recommended.

**SPECIFICATION:**

**Berger's Undercoating for Palladium Finishing Enamel.**—Palladium Undercoating is ready for the brush, but if desired

thinner, add a little turpentine only. **New Work:** The surface must be clean and free from grease. Apply one coat of Lead Primer followed by one coat of Palladium Undercoating Enamel. Allow to dry thoroughly then apply a coat of Palladium Finishing Enamel, as received in the can. **Old Work:** One coat of Palladium Undercoating should be sufficient to form a good ground for the finishing coat of Palladium Enamel. The Undercoating normally dries in about eight hours, but for best results leave for at least twelve hours before applying finishing coat. **White Only:** For best results two coats of Undercoating are recommended.

**Berger's Palladium Finishing Enamel.**

**New Work:** The surface should be clean and free from grease. Apply one coat of Lead Primer followed by one coat of Palladium Undercoating. When thoroughly dry, a full coat of Palladium Finishing Enamel should be applied. **Old Work:** Thoroughly clean the surface to be painted, rubbing down with sandpaper. Dust carefully with a Painter's Duster or wipe over with a damp chamois leather. Apply a coat of Palladium Undercoating then follow with an even coat of Palladium Finishing Enamel. **White Only:** For best results, two coats of Undercoating are recommended. See page 8 for part colour range.

**INTERIOR WOODWORK (TO STAIN AND VARNISH)**

**FLAT STAINED FINISH.**—Berger's FLAT OIL STAIN gives a perfectly flat finish. It should be applied fairly freely and wiped off across the grain. See Berger Page Eight for colour range. For staining and preserving exterior wood surfaces use Berger's Arboreum Wood Stain (Brown). It does not hide the grain, dries with a dull finish, and its Creosote content makes it a preservative against white ants.

**EGGSHELL VARNISH FINISH.**—Apply one coat Berger's Flat Oil Stain in the shade desired. Follow with one coat Berger's Hard Oak Varnish and when dry, finish with one coat Berger's Eggshell Flat Varnish.

**GLOSS VARNISH FINISH.**—Apply one coat Berger's Flat Oil Stain in the shade desired. Then two coats Berger's Hard Oak Varnish. The first coat of Varnish should be very slightly reduced with Pure Turpentine.

**OPEX LACQUERS**

The range of OPEX Lacquer Finishes is so wide and embraces so many different methods of treatment and application that it would be impossible even to attempt to discuss them in these pages. The Berger Technical Lacquer staff, however, is entirely at the service of the profession, and all enquiries will be given careful and immediate attention. If necessary, and where possible, demonstrations will be carried

out and expert advice rendered on the job. OPEX Industrial Lacquers are made in a variety of shades and clear finishes, each carrying its special primers and undercoats. They have already been used with great success in many large buildings in the capital cities of the Commonwealth and in large country centres. For postal address and telephone numbers see Berger Page One.

(Continued on next page.)



## INDEX FOR PAINTING, VARNISHING, ENAMELLING, ETC.

Surface.	Preservatives and Anti- Damp Treatments.	Priming Treatments.	Painting.	Lacquering.	Enamelling.	Varnishing.	Staining.
Brickwork Exterior	Ev-a-dry	Briclac	Sterling Home Paint "T.Z.O."		Durable Enamel		
Cement Exterior	Ev-a-dry	Briclac	Cement Paint Paving Paint		Durable Enamel		
Woodwork Exterior	Weatherol	Primol Aluminium Paint	Sterling Home Paint "T.Z.O."		Durable Enamel	Sevac Carriage Varnish	Shingle Stains
Woodwork Interior		Primol 1071 Paste Filler and Stained Fillers Priming Stains	Sterling Home Paint "T.Z.O." (White) Flat White and Tints	Sevac Brushing and Spraying Lacquers	4-Hour Enamels	Hard Oak Varnish	Hard Oak Varnish combined with Priming Stains Artafec Flat Oil Stains
Galvanized Iron Surfaces	Resistol (Clear)	Resistol	Structural and Roof Paint				
Exterior Metal Work	Resistol (Clear)	Resistol	Structural and Roof Paint				
Metal Ceilings	Resistol (Clear)	Resistol	Flat White and Tints "T.Z.O."	Sevac Brushing and Spraying Lacquers Bronze Lacquers	4-Hour Enamels		
Plaster Walls	Sevac Brushing and Spraying Lacquers	Primol for Oil and Water Paints	Sterling Home Paint "T.Z.O." Flat White and Tints	Sevac Brushing and Spraying Lacquers	4-Hour Enamels		
Fibro Cement	Sevac Brushing and Spraying Lacquers	Briclac	Ev-a-White or Mill White (Water Paint) Cement Paint	Sevac Brushing and Spraying Lacquers			
Keenes' Cement				Sevac Brushing and Spraying Lacquers	Durable Enamel		
Radiators and Pipes			Aluminium Paint	Sevac Brushing and Spraying Lacquers	Durable Enamel		
Burnished Metal Fittings	Sevac Clear Metal Lacquer			Bronze Lacquers Clear Metal Lacquers			

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alkali resistant medium, but as it has less penetration and darkens brickwork slightly, it is more suitable as an economical priming coat, or if a glaze is required on brickwork. This method gives a superior result and appearance. When used as a priming coat it is preferable to painting directly with alkali resistant pigmented paints.

## PREPARATION OF SURFACES

### General Notes on Damp Proofing

The difficulties attendant upon painting surfaces which are liable to retain a mass of moisture for a considerable length of time must be evident, and adverse weather conditions increase them. Where other work is being undertaken, the middle portion of the day being the warmest, and evaporation being at its maximum, it offers the most suitable period for damp proofing to be carried out. In passing, it has also been demonstrated at Cambridge University that metal work painted during the favourable portion of the day resists corrosion far better than when painted when the humidity is higher.

It has been facetiously remarked that "the best way to damp proof a wet wall is to dry it first." There is, however, a fundamental difference between "damp" and "wet" conditions, and it will be found that a cement surface that is apparently dry at mid-day has so reabsorbed water during the night as to be definitely "wet" in the morning.

### The Treatment of Wet Surfaces.

The problem, apparently hopeless at first sight, of painting wet surfaces, for emergency work, has been repeatedly presented to chemists for a solution.

Wax preparations of various types have been used, but the impossibility of painting or kalsomining successfully on top of these liquids requires no explanation. A few years ago the interesting discovery was made by Sterling Varnish Co. that by making certain modifications in Nitro-cellulose Lacquers they would adhere to and dry upon wet bricks, cement, plaster or even wet paper. No previous treatment is required otherwise than wiping off the superficial water with a dry cloth. The film, which dries within 30 minutes, even under the most adverse conditions, is then, for all practical purposes, impervious to water. In this manner wet plaster may be first treated with lacquer and afterwards kalsomined or painted in the ordinary way. There being no saponifiable matter in lacquer it naturally provided an interesting basis for experiment, and, among the more ambitious experiments, we may mention its application as a first coating to a brick house and a large cement wall, ordinary paint being used for the subsequent coats. The general application of lacquers will be more fully dealt with under that heading.

As a matter of interest, the following scale shows the relative porosity of the following dried films upon continuous immersion in water, "1" representing the highest porosity and lowest resistance, and "5" the lowest porosity and highest resistance to water.

1. Raw Oil    2. Boiled Oil    3. Ordinary Varnishes.
4. Ev-a-dry and Briclac    5. Sevac Brushing Lacquer.

These figures are shown without reference to their respective values in other directions.



"Cement Paints," being alkali resistant, provide another satisfactory finish for brickwork. It will be appreciated, however, that no pigmented paint can be made to combine in one operation the effective treatment obtained by the preliminary soaking with a damp proofing anti-alkali liquid and subsequent painting.

### Woodwork

Extensive experiments conducted by the American Forestry Department have shown that comparatively little unsatisfactory painting work is traceable to excessive moisture in wood supplied for construction purposes, though some has been due to woodwork becoming wetted after delivery on the job.



Bearing this in mind, and also the fact that before paint leaves the manufacturer it is subjected to careful tests to see that it is of standard quality, the amount of unsatisfactory and blistered painting work seen must lead to the conclusion that sufficient attention is not being devoted to ascertaining the causes of failure. Some types of cedar in particular are noted for their softening action on paint, and redwood almost equally so. Resinous patches in oregon inhibit drying. This softening action is generally a preliminary to blistering when the warmth of the sun draws the vapours from the ducts of the wood to the surface.

The traditional method of applying paint is to first paint a thin, penetrating priming paint. Where the nature of the wood is such that it will not interfere with the final oxidation of the oil it no doubt acts as an effective "sealer," but the "burning off" of "old" blistered paintwork has revealed the fact that liquid oil has been held for many years under a skin of paint. The reason of blistering is thus apparent, and will convince the observer that linseed oil, or thin linseed oil paint, is not a suitable first coating for woods of these descriptions.

As a further argument against the "general" practice of saturating wood with a thin, oily priming coat, it may be mentioned that the Forestry Department found that paint failed first on summer wood which is most porous and lasted best on spring wood, which is less porous. Again, woodwork primed with aluminium paint has outlasted painting done by the usual methods.

To overcome the difficulties enumerated, the Sterling Varnish Co. has for many years been manufacturing an economical and effective priming liquid known as "Primol." In addition to sealing the surface of the wood it is an effective guarantee that the painting done will dry thoroughly. Certain smooth types of wood present a surface that paint adheres very poorly to, so poorly indeed that it may be removed with the finger nail. Primol gives perfect adhesion, and perfect drying and adhesion is the best possible guarantee against blistering.

Painters have taken exception to paint ready for use on the grounds that it is a standardised product, whereas when working with paint in the paste form and diluting it with linseed oil and turps they can vary the proportions to suit the easier application of succeeding coats.

The objection is logical, but on the other hand the benefit of machined-mixed paints must be evident. The special composition of Home Paints with the correct proportion of "driers" has already been referred to. In order to meet their requirements the Sterling Varnish Company manufacture "Flat White Paint." The usual

(Continued on next page)



# STERLING

## "SEVAC"

### BRONZE LACQUERS

#### METALLIC FINISHES



ROMAN METAL



FLORENTINE



BRASS



SILVER



ANTIQUE



FIRE



OLD GOLD



MOON METAL



COPPER



PALE GOLD

*A New Departure in the Field  
of Lacquer Preparations*

*Supplied ready mixed for use*

*May be brushed; best results  
obtained when sprayed on  
Paper, Woodwork, Fabric,  
Plaster and Metal*

#### GRANITE FINISHES

PALE BLUE, SILVER  
AND BRASSRUBINE, PALE GOLD  
AND ROMAN METALNAVY BLUE, SILVER  
AND BRASSCRYSTAL BLUE, SILVER  
AND COPPERWALNUT, COPPER AND  
SILVERJADE, OLD GOLD, SILVER  
AND FLORENTINEBLACK, BRASS AND  
FIREBLACK, SILVER AND  
BRASS

These are a few examples of what may be obtained by using Sevac Coloured Lacquers as a groundwork and Bronze Lacquers for the Granite effect. For further particulars see article on Bronze Lacquers in this catalogue.



procedure is to make an undercoat "sharper," i.e., less oily than the finishing coat, and this can readily be obtained by mixing Home Paint with Flat White Paint in equal proportions for the first coat and then finishing with the pure Home Paint.

This alters the shade of the undercoat, which is acceptable to many architects as it shows definitely that the work has been efficiently covered by the finishing coat.

### SEVAC PYROXYLIN LACQUERS (For Interior Decoration)

The use of lacquers is growing because they are essentially utilitarian. Pigments in a lacquer medium are less prone to change than in a paint or varnish medium, repair work is consequently more easily effected. They resist the action of cleansing soaps and are hard enough to stand ordinary knocks. Abrasions may be obliterated by rubbing them out with a fine abrasive soap and polishing with a dry cloth. Again, with Sevac Brushing Lacquer (which may also be sprayed), one of the greatest objections to the use of lacquers, namely, toxicity, has been practically eliminated. The toxicity of these lacquers is lower than that of ordinary vegetable turpentine used in paints and varnishes. The public is gradually becoming appreciative of the duller lacquer finish and the moderate lustre it takes through friction. On absorbent surfaces lacquer gives a perfect flat finish. The durability of lacquers on interior work may be said to be indefinite.

By means of an air gun shading effects may be produced that would either be impossible or very costly by means of brush work. Shaded stencil work is executed with rapidity and to perfection.

Wall paper, metal, concrete, plaster, fibro cement, Keenes cement provide surfaces for which Sevac Brushing Lacquer is particularly adapted. Woodwork requires a simple preliminary filling treatment.

The extraordinary damp proofing qualities of these lacquers have been dealt with under the heading "Treatment of Wet Surfaces."

**Metallic Effects.**—Florentine Bronze, Brass, Copper, Antique, Pale Gold, Old Gold, Roman Metal, Silver, Moon Metal, Fire Bronze. This is a new departure in the field of lacquer preparations. Previously it was necessary to mix the bronze powders with a pyroxylin lacquer medium just before spraying, as a detrimental reaction is



It is also an assistance to the painter when working in a bad light.

"Flat White Paint" alone is adapted for ceilings and all flat white work. It may be tinted with stainers.

Exposed unpainted woodwork may be effectively preserved by a dressing of "Weatherol." Weatherol is colourless, but enriches the appearance of woodwork. Shingles and fences are particularly benefited by this treatment and also floors.

set up between the bronze powder and the lacquer. Now these are supplied ready blended for use; the result being that a very much better finish is obtained. The finest effects are produced by finishing with a clear pyroxylin lacquer on top of the bronzes. This preserves them from gradual tarnishing. Some remarkable effects may be produced this way.

Sevac Bronze Lacquers may be sprayed or brushed, on paper, woodwork fabric and metal work, and are admirably adapted for relief work.

### Metallic Shading Effects on Coloured Lacquers

Owing to their composition the bronze lacquers have not the blistering or "raising" effect when superimposed on other coloured lacquers for shading effects or lining work. This also facilitates stencil work and equally makes the application of a spraying of protective clear lacquer a safe operation.

### Granite-Like Effects With Bronze Lacquers

These are easily obtained:—The streaks and splashes of fine granite are imitated by means of an air gun spraying heavy bronze lacquers upon a suitably coloured lacquer foundation. The scheme is well adapted for the decoration of columns, pillars and wall panels. A "spotting gun" is required for spraying the bronze lacquers.

A foundation colour having been chosen—say black lacquer for a black granite—the next step is to "grain" it. One or more bronze lacquers may be chosen. The bronze lacquer is put in the gun "without thinners," and by holding the gun nearly parallel with the surface and releasing the trigger lightly and intermittently the grained effects are produced. Varying the angle crosses the pattern of the grains.

The variety of foundation colours and different bronzes present unlimited opportunities for creating original effects which, however, are only producible with Sevac Bronze Lacquers on account of their peculiar features.

Finally, two sprayings of clear lacquer preserve and enrich the appearance of the surface. This may be pulled over or polished if so desired.

### Lacquered Grained Wood Effects on Steel.

By this means the beauty of grained woods may be combined with the structural efficiency of pressed steel. A lacquered finish leaves nothing to be desired from the utilitarian point of view, while there is a dignified appearance in polished grained woods that lends distinction, particularly to public buildings and large apartments.

The process depends upon craftsmanship for its success, but the cost is by no means prohibitive as graining is rapidly effected with modern implements. Pressed steel doors, furniture, skirting boards and panels are adopted for the display of this very modern art.

In this process a special foundation priming coat is either sprayed or brushed on the steel. The colour of this coat corresponds to the type of wood it is desired to copy. When dry this coat is rubbed perfectly smooth.

### Painting of Galvanized Iron and Constructional Work

There are many preparations designed to make paint adhere to new galvanized iron, but none have proved completely satisfactory. The only safe method is to allow the galvanized iron to weather sufficiently.

Graining is done at this stage by means of very fine pigments bound in a water medium, after the usual manner. Several coats of clear pyroxylin lacquer are then given. This is levelled and polished or burnished by the same process as is adopted in producing high-grade furniture or "piano" finish. The graining being seen through a depth of clear lacquer rivals the finest french polish work in appearance.

Although wide use of the art has been made in U.S.A. it is to be regretted that little use has been made of it in Australia up to the present. Nevertheless, in anticipation of it developing more, the Sterling Varnish Co. has paid considerable attention to the manufacture of a complete range of the products required for this interesting class of work.

(Continued on next page)



## SEVAC "NON-SCRATCHABLE" VARNISH

It is a trite saying, "The name of the firm is behind every tin"; but the fact is that the tin of Sevac Varnish is behind the name of the Sterling Varnish Co. That is the point. There are hundreds of oil varnishes made in the orthodox way and one stands out because the extraordinary toughness of its film resembles celluloid more than an oil varnish film. That one is Sevac "Non Scratchable."

Varnish is used for its glossy appearance, and if that surface will not stand wear and tear and becomes scratched and dull, obviously a coat of boiled oil would be nearly as effective and much cheaper. The varnish that looks pretty only when the painting contractor has left the job may "catch the eye," but in the long run will "hit the pocket."

Recently a varnished lorry collided with a lorry painted with Sevac "Non-Scratchable" Varnish. It was very foolish of it to try conclusions with it. What happened? The varnish came "off" the first lorry (what kind it was, we cannot say), and was literally "smashed" on to the surface of the Sevac lorry by the impact.

Did we varnish the Sevac lorry? Not a bit. An abrasive paste was used to clean the other varnish off the surface of the Sevac lorry and the Sevac "Non-Scratchable" varnish underneath was found, bent, but intact. Sevac Varnish is comparatively quick drying, will neither "spot" with rain or "bloom" in bad weather.

Each tin contains an insurance policy against troubles.

## STERLING HOME PAINT

From the Northern Territory to the southerly extremes of Australia, Sterling Home Paints have proved themselves equal to the trying conditions of the Australian climate. For marine work they have given particular satisfaction. As may be surmised, therefore, they are particularly appreciated in coastal positions where salt air is the most insidious enemy of paint.

The esteem in which these paints are held by the public is due to these facts and to the excellent durability, covering capacity and lustre they possess.

Over a period of years the public are discerning judges, and have by their ever-increasing purchases given their verdict upon the merits of these paints in an unmistakable



manner. This is reflected in the ever-increasing investment in new machinery by the company in order to cope with an expanding turnover.

Experience and careful eliminating tests have brought the formulae to its present high standard. A certain proportion of the linseed oil used in Home Paints is specially processed to give it increased durability. Such oils are expensive and cannot be purchased by the painter and give distinctive features to Home Paint.

This has a bearing upon the assertion that has been made occasionally that paints that are hand mixed are superior to those prepared by the manufacturer.

The application of Home Paints is fully dealt with under the heading "Woodwork."

## T.Z.O. (TITANIUM ZINC OXIDE)

**T.Z.O. (Titanium Zinc Oxide).**—The after-yellowing of white paints, especially in darkened interiors, has been traced to linseed oil itself. Certain pigments, notably Titanium, have the power to "mask" this yellowing. "T.Z.O.," combining as it does the high covering power of Titanium and the smooth hardness of a zinc white paint, represents the ideal white paint for interior and exterior work.

Sulphur gases present in city atmosphere have no blackening action upon "T.Z.O." paint as Titanium Oxide

is inert. "T.Z.O." is sold in the paste form to comply with the requirements of those who prefer to mix their own paint by the addition of the necessary linseed oil and driers.

The cost of "T.Z.O." paint calculated on a gallonage basis is much lower than a similar paint made from either Whitelead or Zincwhite pastes.

This fact, coupled with its great durability and purity of whiteness, has established "T.Z.O." paint in the esteem of users.

## STERLING "4 HOUR" ENAMEL

Not many years ago, had the enquiry been made to paint manufacturers as to the possibility of producing either an enamel or varnish of high durability and a drying rate within 4 hours, the answer would have been unquestionably "No." As painters' enamels are made by grinding pigments in a varnish, the question resolves itself into one of the ability to make a suitable varnish for the purpose. Varnishes are essentially combinations of oil and gum resins.

By the old method of varnish making a high proportion of gum resin and a low proportion of oil yields a quick drying but brittle varnish of poor durability; and a varnish low in gum resin and high in oil, one of high durability, but slow drying. This preliminary explanation is necessary to show that the Sterling "4 Hour" Enamel is radically different from the old type of quick enamel inasmuch as the correct balance between oil and gum resin required for durability has been observed, yet the process produces a quick drying film of extreme gloss and toughness. The obvious deduction is that such enamels made with a varnish containing a correct balance of oil to gum resins, must be free flowing and easy working under the brush, and such is the case. The old, quick type of enamel of low durability was sticky and

difficult for the painter to manipulate, and a slow drying but durable enamel was marred by the adhesion of dust and flies and other troubles incidental to slow drying paints.

This explanation, tedious though it may be, is necessary to show that the Sterling "4 Hour" Enamel is not merely "an old friend under a new name," but is characteristically different from the productions of former days.

The outstanding qualities of "4 Hour" Enamels may be summed up as follows:—Extremely resistant to abrasion, impervious to water, resistant to soap, mild alkalis and acids, kerosene and petrol, easily cleaned and polishable. These qualities make it superlatively a "sanitary finish."

## Application

Suitable for either exterior or interior work. Free flowing, levels readily, dries dust-free within two hours and hard within 6 hours. Requires a hard foundation colour and must on no account be painted over soft paint or cracking may eventually occur. May be used over hard varnishes or lacquers.

(Continued on next page)



## SILVERGLOS (Aluminium Paint)

Recently more attention has been paid to aluminium bronze powder as a protective than a decorative pigment. The flaky particles of the metal have the property of "leafing" on the surface of a paint medium, forming an impenetrable film.

A remarkable proof of this flotation may be seen by making a paint of Black Japan and Aluminium Powder. When painted on no trace of the black medium is visible: it is all bright aluminium. That in itself may be considered insufficient proof of the "leafing" together of the particles, but this may be gauged by the fact that it is even possible to paint a common tar paint with white oil paint provided a coat of aluminium paint is given first. Only Gold Leaf is capable of behaving similarly, as tar penetrates and discolours all oil paints.

Again, Silverglos, which is an aluminium paint, has a high resistance to heat and does not tarnish, which makes it invaluable for radiators and machinery. In the hot districts it provides a roofing paint capable of lowering the internal temperature as much as 10 deg. F. (according to circumstances) when compared with the internal temperature of a building with a red painted iron roof.

The preservative effect of aluminium powder in a paint is so marked that it may be used successfully with quicker drying mediums than necessary for other pigments without sacrifice of durability.

Advantage may be taken of this fact to make a quicker drying paint capable of resisting the softening effects of resinous woods.

Silverglos is an aluminium paint of this type. Silverglos is the result of very many years of research, and provides a paint of great durability and brilliance. Its damp proofing properties on woodwork and the increased durability of oil painting where Silverglos has been used as a primer has already been mentioned. It has also been observed that the addition of a moderate proportion of aluminium paint to ordinary finishing oil paints increases their durability.

When it is considered that a single coat of Silverglos effectively covers a surface like black iron it will not be found expensive.

Altogether, recent experience has given a new value to aluminium paint that makes it well worth the consideration of architects.

## Cement Painting and Kalsomining

It is a good practice to stop suction and provide an adhesive key coat by an application of Primol, unless persistent dampness is present, when the procedures already described may be adopted.

Primol actually combines with the lime in cement and plaster surfaces, thus forming a foundation from which paint cannot be detached or kalsomine scale off.

The readiness with which kalsomine may be spread on a surface treated with Primol ensures a high-class finish.



## Painting and Lacquering of All Metal Work

The surface should be freed from all oil and grease by rubbing with a petrol-soaked rag. Corroded portions should either be sandblasted or rubbed clean with emery cloth. In all cases a rubbing with fine emery improves adhesion. High finishes over rough metal, such as castings or dinged surfaces, are only obtained by the preliminary use of suitable fillers before painting. The fillers are rubbed with fine wet-o-dry sandpaper before finishing.

Suitable fillers are:—Oil Base 1791 Universal Fillers; Pyroxylin Base 2173 Grey Pyroxylin Primer and Surfacer; 2205 Pyroxylin Putty.

## Wood Filling

Upon the successful preparation of interior woodwork for painting and lacquering, depends the appearance of the finished work. The object of filling is to pack the grain of the wood with a non-shrinkable adhesive paste which will retain its binding liquid, dry hard and quickly, and remain unaffected by the solvent action of paint or lacquer. For the best work there has been found no alternative to the paste filler, as it is evident that the heaviest liquids must sink into the crevices. Oil fillers have the defect that they contract during the drying, are slow, thus leaving too much time for the oil to soak away from the pigment and still leave the surface "hungry" and absorbent.

Sevac Neutral Paste Filler is a typical filler that answers the most exacting trade requirements. The filler is smeared over the woodwork and the surplus rubbed off with bagging across the grain of the wood. This action presses the paste into the spaces. After one hour the wood is sandpapered and is ready for painting or lacquering. The appearance of two coats of paint on filled wood is preferable to that obtained by four coats on unfilled wood. Paint raises the grain of the smoothest wood, paste woodfiller prevents the raising of the grain.

As the best alternative for paste woodfiller the Liquid Primol is recommended.

## Repair Work

One of the common difficulties encountered is the fact that repainting work, more particularly in white and light colours for ceilings, is discoloured by some extractive from the smoky surface. These extractives will penetrate through several coats of paint or kalsomine. A preliminary coat of Primol will obviate these troubles.

It is well to remember that Lacquer makes a good foundation for oil paint and kalsomine, but not vice versa.

When matching paints on standing work allowance must be made for the more rapid darkening of the new work.

## GENERAL DISCUSSION UPON SPECIFICATION

It has been noted that some specifications are really formulas.

Standardisation is valuable when applied to ingredients, but the standardisation of results is what really matters.

Where specifications have been based on formulas, it has frequently had the effect of restricting more economical and better production on the part of the manufacturer.


There should be no limit, it will be agreed, to which research and development may be confined, when the improvement of results is its aim.

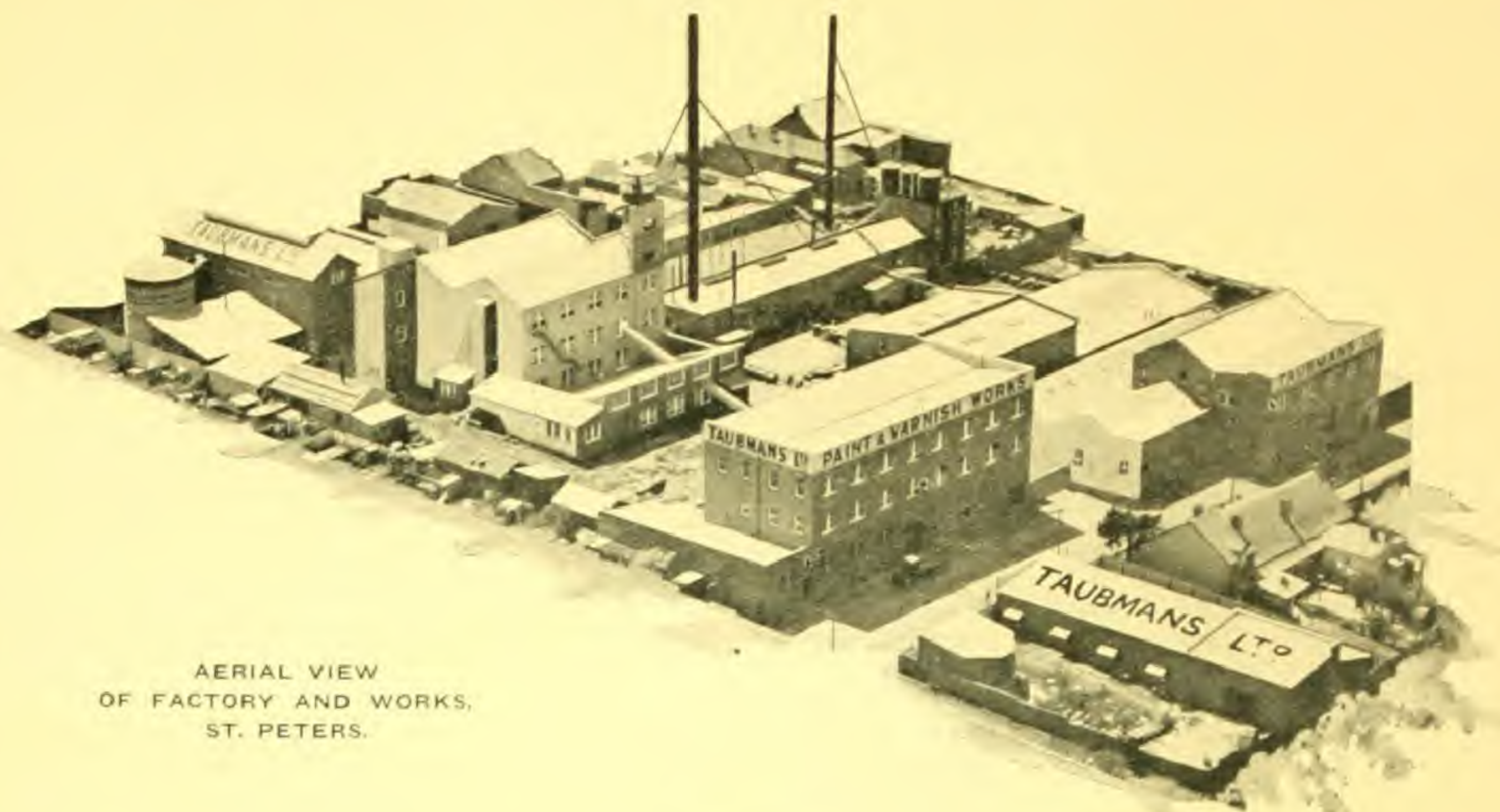
To-day new and important values have been found for materials, which, had it been suggested to use them over 10 years ago, would have been discarded through inability to process them correctly.

The name of a reputable manufacturer is a guarantee against the wilful supply of inferior products as his credit solely depends upon the performance of those products.

Formulation is a matter for the chemist. The manufacturer sells, not a formula (though he is willing to manufacture to any formula, if requested) but a product which he knows will give the maximum value in performance.



	<h1 style="text-align: center;">TAUBMANS LIMITED</h1> <p style="text-align: center;">Manufacturers of</p> <h2 style="text-align: center;">PAINTS, VARNISHES, ENAMELS, STAINS AND LACQUERS</h2> <p style="text-align: center;">Head Office and Factories:</p> <p style="text-align: center;">MARY STREET, ST. PETERS, SYDNEY.</p>	<p style="text-align: center;">A GUARANTEE</p>
<p style="text-align: center;">25</p>		
<p>S.A.A. File No.</p>		<p style="text-align: center;">OF SATISFACTION</p>



AERIAL VIEW  
OF FACTORY AND WORKS,  
ST. PETERS.

#### BRANCHES:

MELBOURNE—Taubmans Pty. Ltd., 24 Lonsdale Street.  
BRISBANE—Taubmans Q'land Ltd., 95 Edward Street.  
PERTH—Taubmans Limited, Surrey Chambers, St. George's Terrace.

ADELAIDE—Agents: Messrs. L. G. Abbott & Co. Ltd., 63 Grenfell Street.  
NEW ZEALAND—Taubmans (N.Z.) Ltd., Wakefield Street, Wellington.

## TAUBMANS PRODUCTS

The range of products bearing the Taubman name completely covers every requirement for the beautification and protection of every type of surface. The manufacture of the various Paints, Varnishes, Stains, Enamels and Lacquers described on the following pages is carried out under the strict supervision of an expert laboratory staff in collaboration with men of long actual painting experience, and each product can be relied upon to be thoroughly dependable. The specifications given with the description of each product are sufficient for general conditions only, and should a special finish be required, or unusual conditions encountered, the services of our Practical

Finishing and Research Departments are at your disposal. Preparation of the work and the conditions under which it will be carried out are essential to satisfactory results.

Because of this, we have, employed on our staff in Sydney and at each of our Branches, representatives fully conversant with all conditions and thoroughly competent to prescribe the correct product to give the desired result and the proper method of its application. We wish all users of Taubman Products to avail themselves of this service, for which there is no obligation imposed.

(Continued on next page)



## PAINT SPECIFICATION CHART

SURFACE	WHEN PAINTING	WHEN STAINING	WHEN VARNISHING	WHEN ENAMELLING	WHEN LACQUERING
EXTERIOR WALLS CONCRETE CEMENT RENDERED FIBRO-CEMENT SHEETS	Taubmans Cement Proof Paints, or Zotena Water Paints, or Staywhite (Mill White)				
BRICK WALLS (Exterior)  NEW WALLS	"Tradex" or Trade Service White, or Service Paints (Ready Mixed) See Spec. Cement Proof Paint		Solpah Weather-Proof Oil (Clear Waterproofing)		
WOODWORK (Exterior)	"Tradex" or Trade Service White, or Service Paints	Penetrol Oil Stains	All Service Oak or Decorators' Exterior Copal or Solpah Weather-Proof Oil	Gloma Enamel (White) or Pearline Enamel (Colours)	
METAL SURFACES (Exterior) ROOFS, GUTTERINGS, FENCES, GATES, FIRE ESCAPES, TANKS, Etc.	Solpah Roof and Structural Paint, or Silvafros				
FLOORS, WOOD (Exterior)		Penetrol Oil Stains	Solpah Weather-Proof Oil (Clear)		
CEMENT FLOORS AND PAVING (Interior and (Exterior)	Solpah Paving Paints				
INTERIOR WALLS CEMENT PLASTER	Russolene Flat Oil Finish, or Zotena Water Paints, or Staywhite (Mill White) or Service Paints (Gloss Finish)			Gloma Enamel (White) or Pearline Enamel (Colours) See Spec. for Undercoats	Fascinac Lacquers (Brushing and Spraying) See Spec.
NEW CEMENT	Priming Coats should be of Cement Proof Paint, see Specifications.				

(Continued on next page)



## PAINT SPECIFICATION CHART

SURFACE	WHEN PAINTING	WHEN STAINING	WHEN VARNISHING	WHEN ENAMELLING	WHEN LACQUERING
CEILINGS PLASTER	Russolene Flat Oil Finish, or Staywhite (Mill White)				
METAL	Russolene Flat Oil Finish, (See Spec. for Undercoats)				
INTERIOR WOODWORK TRIM, PANELLING, DOORS, CEILINGS, Etc.	"Tradex" or Trade Service White, or Service Paints — Russolene Flat Oil Finish	Penetrol Oil Stains	Hard Drying Carriage Varnish, or Fine Pale Copal, or Hard Drying Oak — Eggshell Flat, or Eggshell Gloss	Gloma Enamel (White) or Pearline Enamel (Colours) See Spec. for Undercoats	Fascinac Lacquers Clear and Colours (Spraying and Brushing)
WOOD FLOORS (Interior)		Penetrol Oil Stains	"Varneeros" Clear Varnish		Fascinac Floor Lacquer (Clear)
METAL SURFACES (Interior) PIPES, GRILLES, RADIATORS, Etc.	Russolene Flat Oil Finish (Most Efficient for allowing heat radiation) or Silvafras, or Service Paints			Gloma Enamel (White) or Pearline Enamel (Colours)	Fascinac Lacquers (Brushing and Spraying)
CANE, LEATHER AND FLEXIBLE SURFACES					Fascinac Leather and Fabric Lacquer
CELOTEX	See Special Specifications (Page 228)				
UPSON BOARD AND SIMILAR COMPOSITIONS	Treat as Woodwork (Exterior or Interior)				
TEXTURE FINISHES	See Specifications "Plasco" Texture Finish (Page 228)				

In the foregoing Specifications, the product first mentioned is for the highest class work, except where choice of finish, Gloss or Flat, is given.

(Continued on next page)



## GENERAL PAINTING INSTRUCTIONS

## New Work

In all cases the surface should be thoroughly clean and dry.

**Woodwork.**—Sandpaper to smoothness and dust clean before priming. All knots and sappy places to have a coat of Taubmans Patent Knotting. In the case of Redwood, first treat with Lime Water to counteract the acid present in this timber when new. Apply three coats, following instructions for thinning given with the particular product to be used. Brush each coat out evenly and allow at least 24 hours to dry. Putty all nail holes and cracks before applying second coat. Lightly sandpaper second coat before applying finishing coat.

**Plaster and Cement.**—Follow instructions given with the products recommended.

## Old Work

**Woodwork.**—Burn off and sandpaper where cracked, or peeling obtains, or otherwise necessary. Should Paint Remover be used, wash with soap and water, then twice with clean water, and allow to thoroughly dry before priming. Treat as new work.

**Surfaces Not Burned Off.**—Remove any loose particles, sandpaper to smoothness and dust off to a clean surface. Surfaces where there is a likelihood of grease, such as kitchen surfaces, or where woodwork is much handled, should be treated with Lime Water. Putty all holes and cracks and apply two coats, following instructions given with the product used.

## Specification No. 1

## TAUBMANS CEMENT-PROOF PAINT



Made in White and suitable colours. Special colours will be made to order if not less than five gallons of any particular colour be ordered. A feature of this paint is that it does not require priming solutions—a considerable saving in labour.

It positively resists the chemical reaction of new cement, which, during the process of setting, liberates lime. It remains unaffected by this free lime (alkaline), which quickly destroys ordinary Linseed Oil Paints. This has been definitely proved by its use on numerous buildings applied over new cement, amongst them being the Masonic Club Building, Castle-

reagh Street, Sydney, where it has demonstrated its durability over a number of years.

Taubmans Cement-Proof Paint dries with a gloss that is particularly hard and absolutely waterproof, and will give entire satisfaction when used for both exterior and interior work.

**Application.**—Three coats are necessary for the best results, but in many cases two coats have proved quite satisfactory.

Do not apply until all moisture has disappeared from the cement or brickwork. The paint should be applied undiluted—this applies particularly to the first coat. On rough surfaces, should thinning be required for easy working, pure Turps only should be added. On no account should Linseed Oil be added.

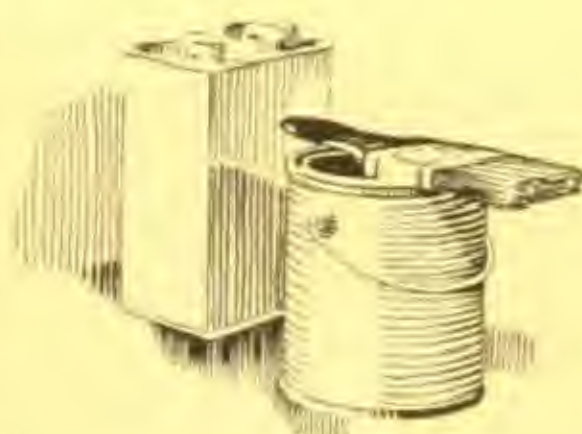
**New Brick Walls.**—One coat of full cover provides an excellent insulation against the alkaline action of the mortar in the joints. When brickwork is porous, two coats are advisable. Other paints may then be used for the finishing coats.

## Specification No. 2

## TAUBMANS TRADEX

## Super Cover White Paste in Oil.

"Tradex" is tendered as our highest quality White Paste in Oil. Its durability exceeds that of any other combination of white pigments. This is particularly so when exposed to light, heat, sea water, and sea-moist atmosphere and air containing corrosive gases. Its covering properties are exceptional, it being possible to obtain a one-coat cover



in white over a dark background. We invite you to apply this test. Paints made from "Tradex" are brilliant in white and clean and unchangeable in tints, and can definitely be described as non-poisonous. "Tradex" is easily broken up, brushes easily, flows out evenly and, if directions for thinning are adhered to, a high grade result must be obtained.

The film of "Tradex" Paint weathers slowly, does not crack or chalk, and gradually, but imperceptibly wears to an even surface while always retaining its weather-proofing, preserving and decorative properties. When repainting ultimately becomes necessary, the film has become an ideal undercoating surface, there being no need for expensive burning off or sandpapering. This characteristic is peculiar to the blend of pigments contained in "Tradex" and is quite distinct from the severe cracking and chalking of Zinc Oxide and White Lead respectively. We recommend "Tradex" for all interior and exterior work and where maximum durability is the objective. One cwt. yields 9 to 9½ gallons of full cover paint.

## MIXING DIRECTIONS. (To each One Cwt.)

**First Coat on New Work.**—Add 5½ to 6 gallons Raw Linseed Oil and ¼ to ½ gallon Pure Turps.

**Second Coat.**—Add two gallons Pure Turps and ¼ gallon Raw Linseed Oil. Sufficient Turps is necessary to cut the gloss and ensure against cissing of finishing coat. Do not over-thin with oil and affect opacity and covering.

Although yield is less for second coat, it will spread almost as far as in first coat or finishing coat.

**Finishing Coat.**—Add 5½ to 6 gallons Raw Linseed Oil and pint to ¼ gallon Pure Turps. Dryers are to be added to each coat. The use of Mineral Turps is not advisable.

## REPAINTING OLD WOODWORK.

**First Coat.**—Follow instructions given for second coat on new work. Finish as for new work.

## Specification No. 3

## TAUBMANS TRADE SERVICE WHITE

A dense, pure White based on highest grade Zinc Oxide and Titanium. It is similar in composition to "Tradex" and is supplied in ready-mixed heavy bodied form; 1½ gallons of oil or turps may be added to each four gallons. The user is saved the time and labour of mixing, yet is able to apply what is practically a different mixing for each coat. Taubmans Trade Service White gives exceptional covering, spreading and durability and freedom from cracking, powdering and discoloration. It will take the same Stainers as White Lead and not chemically react. As a medium between Paste Whites and Ready-Mixed Paints it has attained great popularity in the painting trade.

Full directions for thinning for each coat are given on each container.

(Continued on next page)



## Specification No. 4

## SERVICE UNDERCOATING PAINTS

(Colour Range is shown on Page 223)

The use of Service Undercoating Paints is strongly recommended as ensuring the very best results. They enable users to follow what has always been recognised as proper painting practice, viz., apply a different mixing for priming, second and finishing coats. Service Undercoating Paints dry with a firm semi-gloss and provide an ideal key surface for the finishing coat. Maximum obliteration and spreading is obtained, cissing, sagging and sheering is eliminated, and the finishing coat dries to a richer gloss and gives longer durability.

Service Undercoating Paints are supplied in White, Cream, Stone, Light Neutral and Dark Neutral—adequate for the full range of finishing colours. Full directions are given on each container, together with a list of finishing colours for which each is intended.



## SERVICE PAINTS

(Colour Range is shown on Page 223)

Taubmans Service Paints do not contain poisonous White Lead, being based on high-grade Zinc Oxide, correctly balanced with selected pigments and purest base colours, combined with specially blended oils. Ground to the utmost fineness, they brush freely and are outstanding from other ready-mixed paints in their covering and spreading properties. Service Paints offer positive resistance to the corrosive action of sea-moist atmosphere and tropical sun, and are renowned for their duration of service under all climatic exposures. A special feature of Service Paints is the total absence of cracking or chalking, the film wearing gradually to an ideal surface for re-coating, when re-painting ultimately becomes necessary. As an alternative to using Service Undercoating Paints, and for small or less important work, use Service Paints for the entire work as follows:—

## APPLICATION.

## NEW WORK REQUIRING THREE COATS:

First and Second Coats.—Add one pint pure Turps to each one gallon. Do not add oil.  
Finishing Coat.—Apply straight from the can.

## Specification No. 5

## TAUBMANS RUSSOLENE FLAT OIL FINISH

(Colour Range is shown on Page 225)



A durable, washable and non-absorbent Flat Oil Finish for all interior surfaces—plastered walls and ceilings, metal ceilings, woodwork, wallboards, etc. Produces a delightful satin finish, preferable to dead flat, as it does not smear, mark, or allow dirt to ingrain to the same extent, and is far more washable. Its surface aids the correct diffusion of light and affords an excellent setting for good-class furnishings. It flows out from the brush and levels to an even surface, showing no lap marks or brush marks. It can be scrubbed without injury to the finish and is therefore quite sanitary.

The covering and spreading properties of Russolene are well above the average, one gallon covering approximately 1,000 square feet.

The covering and spreading properties of Russolene are well above the average, one gallon covering approximately 1,000 square feet.

**Application: New Work.**—New plaster or cement walls must first be given one coat of Russolene Primer. The addition of a little Russolene to the Primer will assist the covering of the first coat. Do not use Glue Size or Linseed Oil. Any holes or cracks should first be dabbed with Primer, then filled with putty made from Russolene and plaster of paris—not Linseed Oil. See that the surface to be coated is quite dry. Work with windows and doors closed, opening them immediately work is completed.

**First Coat.**—Add Russolene Primer to the extent of 25 per cent. to 50 per cent., mixing thoroughly. Flow on and brush well out. Each coat requires at least 24 hours to dry before applying next coat.

**Finishing Coat.**—Apply undiluted, but if too heavy bodied for convenient working, thin by adding Turps until of such consistency that it flows easily and smoothly from the brush.

**Old Plastered Walls.**—If previously coated with Kalsomine, wash down and remove Kalsomine, then treat as new walls. When recoating old flat-painted walls, use for first coat Russolene thinned with equal quantity of Russolene Primer. **Woodwork.**—Follow directions given for Plaster, both new work and repainting.

## METAL CEILINGS.

**First Coat.**—Add approximately 20 per cent. Russolene Primer.

**Finishing Coat.**—Apply undiluted.

## Specification No. 6

## TAUBMANS STAYWHITE—(THE SUPERIOR MILLWHITE)

Suitable for cement and plaster walls and ceilings, fibro cement, stucco, etc. Noted for its purity of white and dense covering properties. Supplied in paste form requiring only the addition of cold water. Where a sanitary finish of low cost is desired, particularly on factory walls, light areas, etc., Staywhite is unequalled. It dries to a matt finish, binds firmly to the surface so that it will not rub off, yet does not harden to the point of scaling. One cwt. will cover approximately 800 square yards on smooth surface.

**Application.**—Staywhite may be brushed or sprayed. Two coats are necessary on new cement, etc., but on plaster ceilings, one coat is generally sufficient.

**Interior Surfaces.**—Thin with approximately three-quarters of its own bulk of water—until it is of ordinary paint consistency or slightly thinner. Allow to thoroughly dry before applying second coat.

**Exterior Work.**—Add one gallon Taubmans Binding Emulsion to each cwt. or, alternatively,  $\frac{1}{2}$  to  $\frac{3}{4}$  gallon Raw Linseed Oil to each cwt. Stir in well until thoroughly mixed before adding water.

**WARNING.**—Surfaces that have previously been lime washed should be thoroughly cleaned down and as much of the old lime as possible removed. The presence of lime beneath the coating of Staywhite will weaken its binding properties, eventually causing it to rub and peel. On very absorbent surfaces, too great a proportion of the binding constituents are absorbed into the surface, leaving the paint on the surface insufficiently bound. To obviate this trouble, a good wetting with water immediately prior to painting is advisable.

## Specification No. 7

## TAUBMANS ZOTENA WATER PAINTS

Zotena is really "Tinted Staywhite" and possesses the same qualities and characteristics for which Staywhite is noted. The colour pigments are thoroughly ground in during its manufacture, ensuring an even density of colour. The colour range consists of 24 tints of high decorative value. Colour books supplied on application.

**Application.**—Treat as Staywhite. (See Specification No. 6.) Special overbound quality suitable for outside brick, cement work, etc., is available.



(Continued on next page)



## TAUBMANS SERVICE PAINTS

READY FOR IMMEDIATE USE

Special undercoats, adequate for the full range of  
Finishing Colours, are obtainable.

For Specification No. 4.

56—TUSK

70—RIVER GREEN

78—CREAM

79—SALMON

69—WEDGWOOD GREY

90—EAU-DE-NIL

58—STRAW

83—WARM STONE

73—FRENCH GREY

91—PEA GREEN

71—SANDSTONE

64—TAN

92—SILVER GREY

72—APPLE GREEN

898—OCHRE STONE

85—SEAWEED BROWN

94—SLATE GREY

93—BRILLIANT GREEN

897—FLESH STONE

65—SIENNA STONE

89—LIGHT BLUE

74—WINTER GREEN

62—LIGHT STONE

86—VENETIAN RED

96—AZURE BLUE

76—OLIVE GREEN

60—BUFF

75—INDIAN RED

88—BUNGALOW BROWN

95—MID. GREEN

81—MID. STONE

87—VELVET BROWN

67—SIGNAL RED

97—DARK GREEN

82—DARK STONE

66—CHOCOLATE

69—MAROON

77—BRONZE GREEN

ALSO BLACK, GLOSS WHITE AND FLAT WHITE

(Continued on next page)



## TAUBMANS SOLPAH PRODUCTS

## Specification No. 8

SOLPAH ROOF AND STRUCTURAL  
PAINTS

The most enduring protection for all exposed iron and steel structures, particularly galvanized iron roofs, tanks, guttering, fences, fire escapes, bridges, etc. "Solpah" resists rust, definitely prevents corrosion and successfully withstands all extremes of climatic exposure. One coat covers well and gives years of service. It works easily, dries quickly, and reduces temperatures of roofs, particularly the light grey and white, and does not contaminate tank water. "Solpah" is supplied in a suitable range of colours. Colour cards on application.



**Application.**—Remove any scale or rust and see that the surface is clean. New galvanized iron work should be allowed to weather for about six to eight weeks before painting. One coat is generally sufficient. Where two coats are to be applied use the paint straight from the can.

**Old Work.**—Remove all rust and loose or scaly paint and apply one coat.

## Specification No. 9

## SOLPAH WEATHERPROOF OIL

Solpah Oil is a blend of weather-resisting oils, uniquely treated, that provides a tough elastic film of the utmost protective value. Practically colourless, it dries to a high-polish lustre that retains its gloss under exposure to sun and rain and immersion in salt or fresh water. It preserves and beautifies outside woodwork, heightening the natural colour and grain of the timber, at the same time forming an impassable barrier to all causes of decay. On brick walls it provides a glossy waterproof film that prevents penetration of the weather.

**Application: Exterior Woodwork.**—Clean the woodwork, sandpaper where necessary, and apply two coats. Brush on freely, spreading each coat out evenly. It is advisable to allow two to three days between coats if convenient. Do not apply while the timber is damp or green.

## Specification No. 11

Silvafros is distinct from all other Aluminium Paints or Enamels owing to the special blend of oils which forms its medium. This medium gives to Silvafros an extra brightness, longer length of service and greater resistance to heat and weather exposure. It positively prevents rust, does not tarnish, and is unrivalled as a durable, bright silvery finish for all surfaces. The light reflective properties of Silvafros, together with the fact that dirt and dust can be easily washed from its surface, make it an ideal coating for interior walls and ceilings of workrooms and factories. On petrol storage tanks, in addition to preventing rust and corrosion, it reflects the sun's heat instead



**Brickwork.**—Clean down and apply three coats. Use a stiff, short-bristle brush for the first coat, and "punch" into the pores of the brick. Before applying second coat, putty all holes and cracks. Second and final coats may be brushed on freely. Allow at least 24 hours between coats—two to three days, if convenient.

**Interior Woodwork.**—To accelerate drying, add  $\frac{1}{2}$  pint Taubmans Terebine to each gallon. Apply as varnish.

## Specification No. 10

## SOLPAH PAVING PAINTS

Sun and weather proof, water-proof and traffic-resisting, Solpah Paving Paint gives long service on cement paths, floors and steps, both indoors and outdoors. It is more than a mere coating of colour, as it not only gives a smooth colourful evenness, but binds the cement surface, preventing it wearing into destructive gritty particles. Though made specially for application on cement, it is satisfactory on almost all surfaces and many extra uses can be found for Solpah in every building and residence. Being heat-resisting and easily cleaned, it is excellent for fireplaces and hearths.



It is not advisable to use Solpah on floor tiles owing to the lack of porosity to form a key for the paint to adhere.

Used on roofing tiles, it prevents leaking and vegetating and, in addition, provides colour effects not obtainable in pottery.

Solpah is supplied in White, Black, Ferric Red, Dark Red, Slate Grey, Silver Grey, Lino Brown, Cream and Green. Colour cards on application.

**Application.**—Solpah Paving Paint is not intended for use on new cement and sufficient time should be allowed for the cement to age. This time varies according to conditions, but usually six to eight weeks is sufficient. See that the surface is thoroughly dry and free from dirt and grease. Apply two coats, brushing out evenly. On indoor surfaces, allow two days for first coat to harden. Outdoors, 24 hours is sufficient.

Use undiluted, but should thinning be required, use only pure Turps.

## TAUBMANS SILVAFROS

of absorbing it and so lessens the evaporation of the contents. Silvafros has been extensively used for this purpose by various oil companies.

Silvafros gives much greater coverage than ordinary paints, due to the tiny flakes of aluminium flattening out and inter-leaving when being applied. For this reason it is most satisfactory in preventing "bleeding through" of bituminous factory finishes on pipes and as a priming coat on metal surfaces that are to be enamelled or otherwise coated.

Silvafros excels in salt air resistance, retaining full brilliance over years on launch and yacht parts.

One coat covers exceptionally and is effective even over black.

**Application.**—Remove any rust, scale or loose paint (if old painted surface) and see that the surface is clean and dry. Brush out to a uniform coat.

(Continued on next page)



# RUSSOLENE FLAT OIL WALL FINISH

See Specification No. 5



145—LIGHT GREEN



130—IVORY



140—PARIS GREY



146—APPLE GREEN



131—PALE CREAM



162—LILAC



136—MARINE GREY



133—FAWN



139—SATIN GREY



147—JADE GREEN



132—BUFF STONE



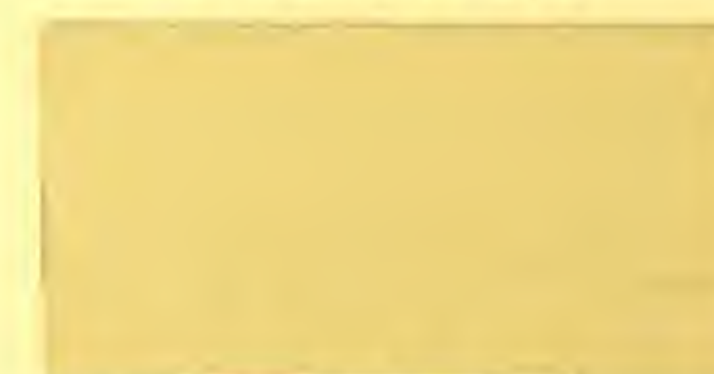
142—MORNING GREY



143—WENTWORTH BLUE



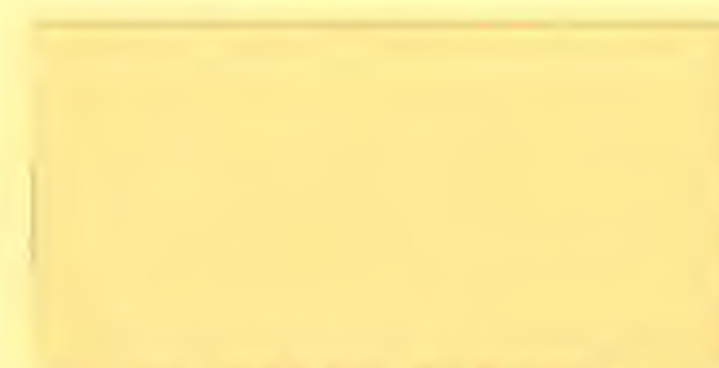
134—CINNAMON



137—SHALE GREY



148—LIGHT OLIVE



129—PEACH BLOSSOM



138—WINDSOR GREY



161—POWDER BLUE



135—POMPEIAN RED



144—MACQUARIE BLUE

— ALSO WHITE —

(Continued on next page)



## Specification No. 12

## TAUBMANS GLOMA ENAMEL

Gloma is the superlative of White Enamels. It is outstanding in its purity of whiteness, beauty of lustre and long-wearing properties. It remains unaffected by steam, hot water, and extremes of heat and cold, and will not turn yellow. Gloma is scientifically compounded to produce a film that dries hard, yet remains elastic. This has been demonstrated by coating a piece of pliable tin with Gloma and, when dry, bending the tin double and then straightening it without in any way injuring the enamel film. The surface of Gloma may be regularly washed without injury, even with a weak solution of disinfectant, and is eminently suitable for walls, etc., of factories engaged in the preparation of foodstuffs, refrigerator rooms, hospital operating theatres, bathrooms, lavatories, etc.

Gloma may be specified with full confidence as producing the very highest grade results in enamelling.

## APPLICATION.

**WOODWORK.**—Sandpaper to smoothness and, if Redwood, treat with lime water.

**First Coat.**—"Tradex" thinned as for first coating (see Specification No. 2).

**Second Coat.**—"Tradex" thinned as for second coating (see Specification No. 2).

Putty all holes, etc., before applying.

**Third Coat.**—Gloma White Undercoating.

**Finishing Coat.**—Gloma Enamel applied straight from the can. Should the enamel require thinning through any reason, add only special Gloma Thinners, or pure Turpentine.

**OLD WORK.**—Remove all loose particles, sandpaper to smoothness, dust off and treat with lime water. Follow directions given for new work with these exceptions: (a) If previously white and in clean condition, omit first and second coats; (b) If old paint work is marked and faulty in any way, omit first coat only.

Where burning off has been necessary, treat entirely as new work.

## NEW PLASTER.

**Prime Coat.**—Solpah Oil thinned by the addition of approximately 10 per cent. pure Turps.

**First Coat.**—"Tradex" thinned as for second coat (see Specification No. 2).

**Second Coat.**—Same as first coat.

**Third Coat.**—Gloma White Undercoating.

**Finishing Coat.**—Gloma Enamel applied straight from the can. Should the enamel through any reason require thinning, add only special Gloma Thinners.

**METAL SURFACES.**—Remove all rust or scale and clean thoroughly.

**First Coat.**—Taubmans Silvafros.

**Second Coat.**—Gloma Undercoating.

**Finishing Coat.**—Gloma Enamel (undiluted).

## Specification No. 13

## PEARLINE ENAMELS

Pearline Enamels possess the same characteristics as Gloma Enamel (see Specification No. 12) and are supplied in a range of 36 colours, which may be mixed together in varying proportions giving almost any shade desired.

A range of Undercoats adequate for the full range of Pearline Enamels are obtainable and these are listed, together with the colours of Enamel for which they are intended on the colour cards. Colour cards on request.

**Application.**—Follow directions given for Gloma Enamel (Specification No. 12), using the special Undercoatings as mentioned above.

## Specification No. 14

## TAUBMANS PENETROL STAINS

Clear, full-toned stains, not containing Tar or Creosote, but based on firm-drying, non-resinous oils that preserve the timber.



Penetrol enriches the natural beauty and grain by penetrating into the surface and placing the transparent stain colours right into the wood, retaining and enhancing its texture and adding a depth and dignity unequalled by any other treatment. This penetration is a feature much appreciated by tradesmen, as it permits sandpapering without lightening or causing unevenness of the tone.

Penetrol Stains are available in 13 tones, and may be inter-blended or reduced with pure Turps.

**Application.**—Apply freely with a brush, working each brushful well into the timber. No wiping off is necessary. Allow 24 hours to dry and harden before varnishing or lacquering.

**Finishing.**—Where Eggshell Gloss or Eggshell Flat Finish is desired, first apply a full coat of Taubmans Hard Drying Oak Varnish. This supplies body and depth and adds greatly to the durability of the finish.

**Lacquering.**—The polish-lustre finish so much in modern demand is quickly and conveniently obtained by applying one or two coats Fascinac Clear Lacquer, either by brush or spray.

One coat gives a subdued, clear lustre, is very quickly applied, and exceptionally hard-wearing, presenting that tough, tack-free hardness inherent to good quality Nitro Cellulose Lacquer.

Two coats fill the grain better, increase the lustre and provide longer service. The first coat dries in 10 minutes and the second coat may be applied an hour after.

## Specification No. 15

## TAUBMANS VARNISHES

The range of Varnishes we manufacture is a most comprehensive one and completely covers every requirement. We cannot, in these pages, enumerate each special varnish and grade of varnish, and we are describing those only that are in general use for the purposes for which they are specified.

**Application.**—To obtain best results always avoid applying varnish when the atmosphere is damp or foggy, and cease work a couple of hours before night-fall. See that the surface to be varnished is clean and dry and free from grease. Whenever there is a probability of grease, first treat the surface with lime water. Brush out to an even coat.

**Taubmans "All Service" Oak.**—"All Service" is the highest grade "Oak" Varnish, excels in durability and lustre and is suitable for both exterior and interior work.

**Taubmans Decorators' Exterior Copal.**—A high-grade, full lustre varnish, particularly durable on exposed surfaces. Recommended for highest class work and where resistance against weather exposure is essential.

**Taubmans Fine Pale Copal.**—Richness of lustre and elasticity are outstanding features of this varnish, and we strongly recommend it for the best class of interior work.

**Taubmans Hard Drying Carriage.**—A particularly durable varnish for all interior work where hard wear is to be contended with.

**Taubmans Hard Drying Oak.**—A full-bodied varnish for interior and sheltered surfaces. Thoroughly dependable and universally used for all general work.

**Taubmans Eggshell Flat.**—A perfectly balanced wax finish for flat varnishing and all interior stain work. Both Eggshell Flat and Eggshell Gloss (described below) provide a finish only and do not by themselves form a protective coating. It is advisable to "body up" by first coating with Taubmans Hard Drying Oak Varnish (see Specification No. 14).

**Taubmans Eggshell Gloss.**—Similar to Eggshell Flat, excepting that it dries with a pleasing sheen and is an alternative finish for stain work where a high gloss or true Eggshell Flat is not desired.





# TAUBMANS FASCINAC LACQUERS

FOR BRUSHING  
OR SPRAYING



CAMBRIDGE BLUE

FULL GLOSS OR  
SEMI-LUSTRE



SHELL GREY



PUTTY GREY



CRUISER GREY



MACQUARIE BLUE



APRICOT



GOLDEN TAN



RICH CREAM



TUSK



CORAL PINK



ROSE PINK



WESTERN RED



MAHOGANY BROWN



JUNGLE GREEN



FOREST GREEN



VENETIAN GREEN



APPLE GREEN



ORIENTAL RED



ORANGE



BRILLIANT YELLOW



WATTLE



TURQUOISE



AZURE BLUE



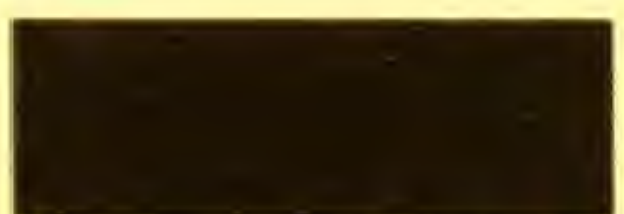
CANBERRA BLUE



JADE



MAUVE



MISSION BROWN



ISLAND BROWN



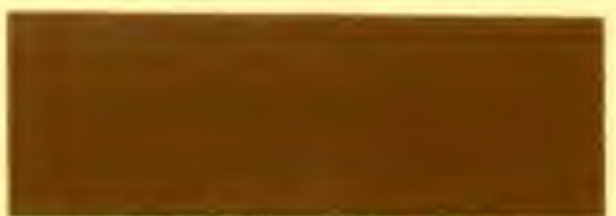
MARINE GREEN



DEEP WINE



MANDARIN



CIGAR BROWN



CLARET

MANY ADDITIONAL TINTS AND COLOURS MAY BE OBTAINED BY MIXING ANY OF THE ABOVE  
COLOURS TOGETHER IN VARIOUS PROPORTIONS.

(Continued on next page)



## Specification No. 16

## CELOTEX AND INSULATING BOARDS

Extreme porosity excludes these materials from general painting specifications. When merely coloured, its rough surface is, under certain conditions, quite pleasing. If this effect is suitable, Zotena Water Paints (colours) or Staywhite (White only) will produce the desired result and prove satisfactory. Two coats are necessary to obtain evenness of colour.

Should a coating or film be considered advisable to waterproof or otherwise protect the surface, or should the decorative effect require a paint or enamel finish, we advise the following procedure.

In every case, whether the finish is to be Gloss Paint, Flat Oil Paint or Enamel, a priming coat is necessary. For this purpose, a coat of Taubmans Staywhite will prove most effective in stopping the pores and preparing the surface for the first coat.

## WHEN GLOSS PAINT FINISH IS REQUIRED:

**Priming Coat.**—Taubmans Staywhite thinned with water to usual paint consistency.

The choice of three products is given: "Tradex," Trade Service White or Service Paints.

## Specification No. 17

## TAUBMANS PLASCO TEXTURE FINISH

Texture finishes offer greater scope for the expression of individuality than any other type of decoration. Plasco particularly is easy to apply and tradesmen, even though inexperienced in the application of texture finishes, quickly become adept. A sponge, a crumpled cloth or piece of hessian, almost anything at all, is handled to obtain a variety of decorative effects. There are two types of general texture finishes:—One Coat Finish and Glaze Coat Finish.

## DIRECTIONS.

**One Coat Finish.**—This is obtained with one coat of Plasco alone, without sizing or glazing. Mix Plasco and tint with dry colour, brush on to desired thickness and texture with brush, sponge, knife, etc. Sandpaper when dry. This completes One Coat Finish.

**Glaze Coat Finish.**—The Plasco is applied, either coloured or uncoloured, sized with Plasco Size and glazed with Plasco Glaze Coating to give a finish of any one colour or a combination of colours. The three materials used to produce the texture finishes are:—

**Plasco.**—A white powder which, when mixed with water, gives the base or texture.

**Plasco Size.**—A powder which is dissolved in boiling water and is used for sizing the texture finish before glazing with Plasco Glaze Coating.

**Plasco Glaze Coating.**—A heavy glazing material made from drying oils. It is transparent and any colour may be mixed with it. It is easily wiped off, thus bringing out the high lights and the texture and dries to a soft velvety sheen.

Mix Plasco and brush on, the thickness depending on the texture desired. Texture with brush, sponge, knife,



**"Tradex."**—Follow instructions for first, second and finishing coats on new work given in Specification No. 2, adding extra oil in first coat.

**Trade Service White.**—Thin as instructed for new work given on the container; apply three coats.

**Service Paints: First Coat.**—Service Undercoating Paint, adding one pint Raw Linseed Oil to each gallon.

**Second Coat.**—Service Undercoating Paint, straight from the can.

**Finishing Coat.**—Service Paint straight from the can.

## WHEN FLAT OIL FINISH IS REQUIRED:

**First Coat.**—Same as for Gloss Paint Finish.

**Second Coat.**—Russolene Primer.

**Third Coat.**—Equal parts Russolene and Primer.

**Finishing Coat.**—Russolene straight from the can or thinned with pure Turps, if necessary, for easy working.

## WHEN ENAMEL FINISH IS REQUIRED:

**First and Second Coats.**—Same as for Gloss Paint Finish.

**Third Coat.**—Gloma Undercoating or Pearline Undercoating respectively, according to whether white or colours are required.

High Gloss Enamel gives a very pleasing effect on the rippled uneven texture of Celotex.



etc. When dry (next day), sandpaper thoroughly. Apply size to stop suction of Plasco. The following day glaze in one or more colours with Glaze Coat tinted with oil colours. Wipe surface with cloth.

**Preparations of Surfaces.**—The same procedure and precautions are observed as though the operator was going to apply ordinary oil paint, care being taken with cracks, grease, wax, kalsomine, dust, etc. Plasco will stick to any surface if the usual care in preparing the surface is taken. Old paint or varnish must be firm and wallpaper removed if the colours bleed or if the water in Plasco will loosen the paper. It requires very little trouble to make a small test on any surface if the operator is in any doubt. Glossy surfaces such as varnish, enamel and the like should be treated with medium solution of washing soda, but care must be taken to see that the soda is thoroughly washed off before applying Plasco. Uneven or excessive absorption of any surface should be stopped by sizing

with, say, a mixture of boiled oil and turpentine. Fine cracks may be treated with a sharp coat of paint, but under no conditions use glue size, gloss oil, or the like.

**How Plasco is Mixed.**—Mix in hot water. It is better to put Plasco into the water rather than to pour the water into the Plasco. Stir thoroughly and vigorously while adding the material and mix to such consistency that the groove which follows the stirrer remains for approximately two minutes before it goes down into the mixture. If hot water is used, Plasco will be ready to apply within half an hour. Should the material when ready to use be too thick or too thin, adjust with more water or more Plasco and, in this case, allow to stand another 10 minutes to get complete blending. Be careful to avoid lumps. Plasco will not set up in the

(Continued on next page)



container, but it is best to use within a few days after it has been mixed. If it is to stand more than a few hours, drying on the surface may be stopped by covering the top of the material with a wet cloth. Do not add any foreign materials in order to make the material go further.

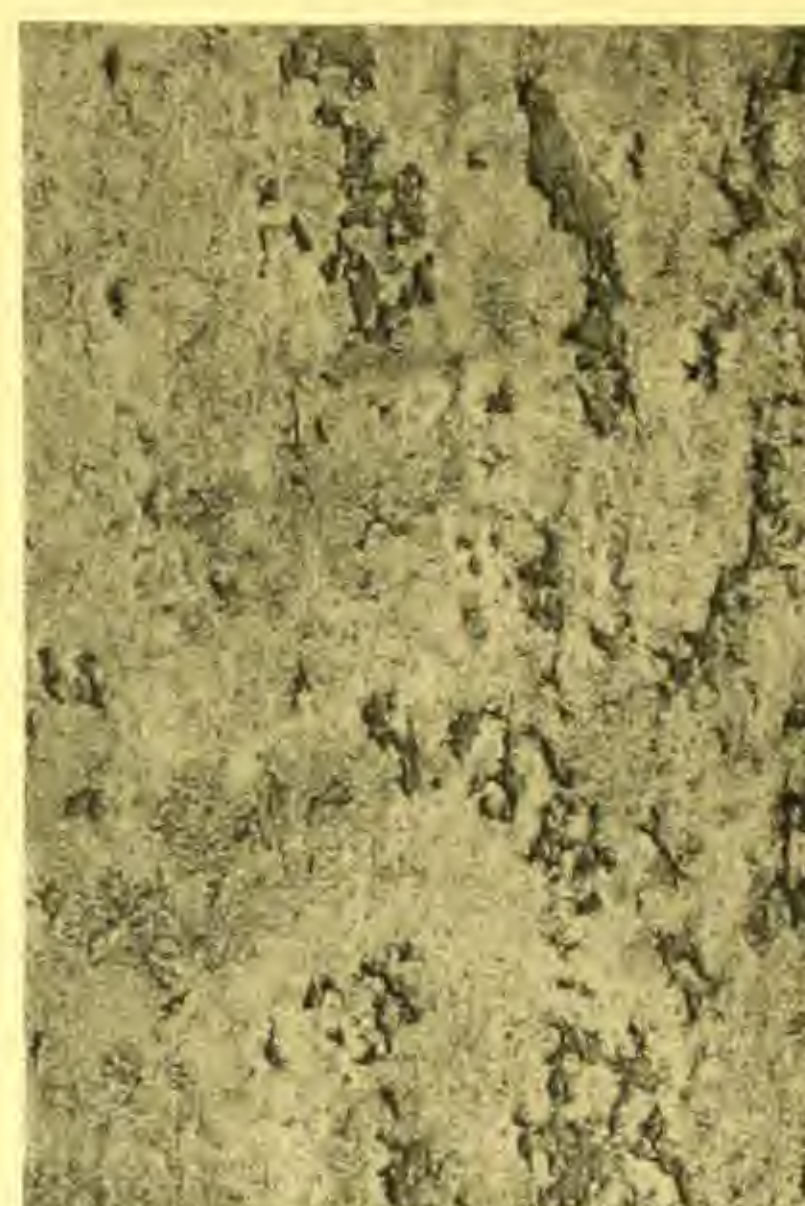
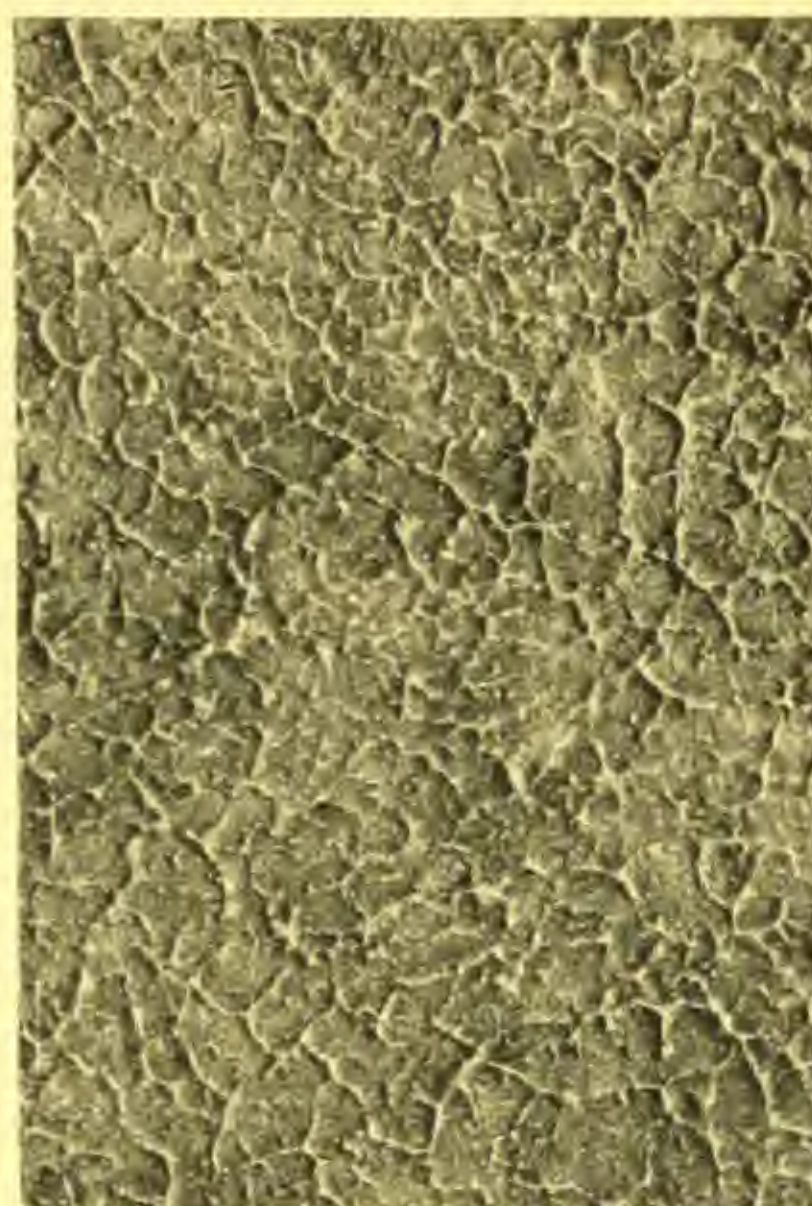
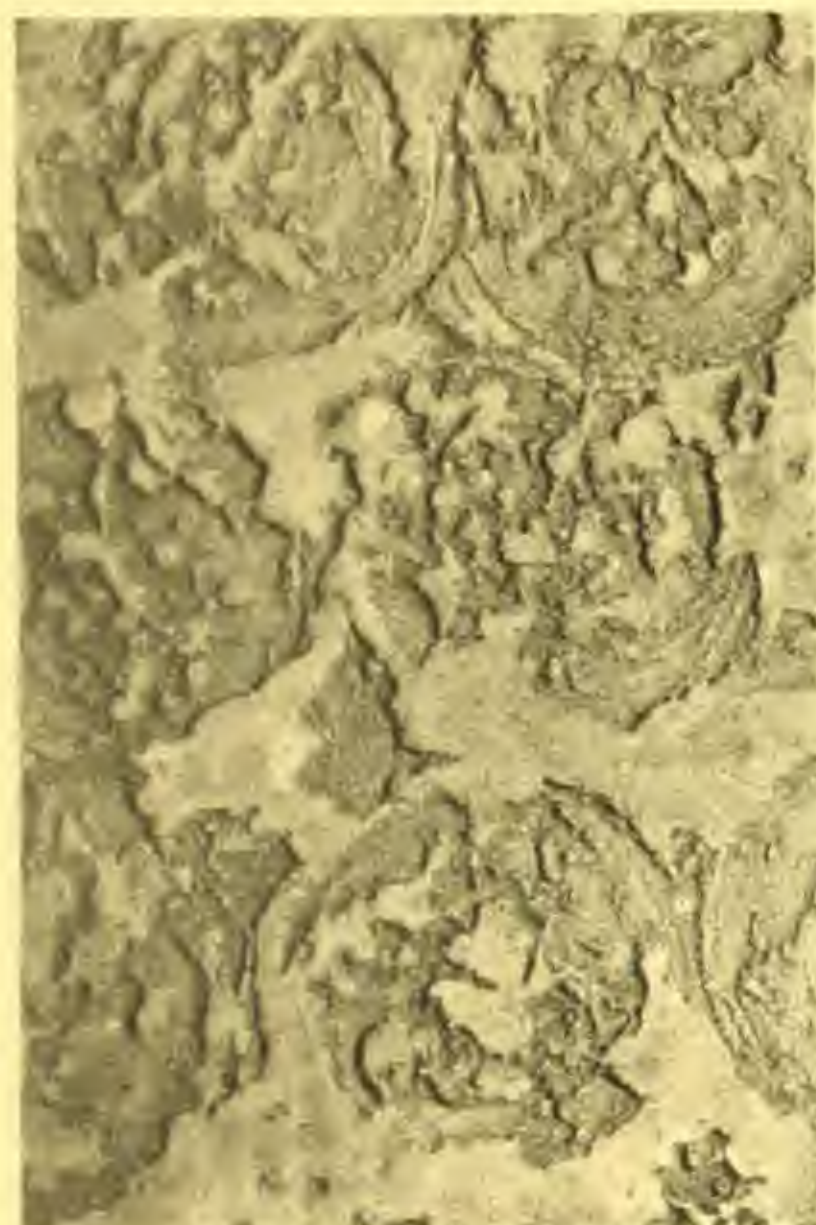
**How to Apply Plasco.**—Use an ordinary wall brush of medium length bristles, spreading the material on evenly and texture in a few minutes with a brush, sponge, knife or stippler. Allow to dry (this will take about 12 hours) and, if one coat finish is desired, sandpaper lightly and the job is finished. A one coat finish means an application of Tinted Plasco, textured and sandpapered. For a glaze coat, sandpaper to a smooth surface and apply a coat of Plasco Size and a coat of Plasco Glaze coating.

**How to Colour Plasco.**—Use dry colours of good quality and permanency, breaking down the colour in water to a creamy consistency. After straining through cloth to eliminate lumps, stir the colour into a small portion of the Plasco and then add to and stir thor-

oughly into the whole and mix. For colours requiring a large amount of dry colour, break up the stainer with Plasco Size. Test the colour by quickly drying a small sample, as the colour when wet will be several shades darker than when dry.

**How to Mix Plasco Size.**—Gradually add approximately 1 lb. of Size to 1 gallon of boiling water, stirring to complete solution; stir occasionally while cooling and do not use until cold, adding a little water if necessary. Apply over Plasco with an ordinary wall or round brush to stop suction, stippling to secure an even coating, and do not apply Glaze Coating until the size is thoroughly dry. If dry colour is to be put in the size, mix the size somewhat thicker and after cooling add dry colours and strain through a cloth before using.

**How to Use Plasco Glaze Coating.**—Tint with oil colours, avoiding those which are known to change. Spread evenly over the surface with an ordinary brush. Stippling will give a better blending of the colour. Allow to set a few minutes until tacky and then wipe evenly and carefully with a cloth folded into a pad.



PLASCO TEXTURAL EFFECTS.

These illustrations, together with the one shown on the opposite page, are but a few of the many charming decorative effects obtained with Taubmans Plasco Texture Finish.

### Specification No. 18

## TAUBMANS FASCINAC LACQUERS

Colour Range is shown on Page 227.

Fascinac Lacquers are obtainable in Clear and Colours and for application by brush or spray gun. Though there has been a tremendous growth in the use of the brushing quality of Fascinac Lacquers, the spraying method of application is strongly advocated where large surfaces are to be coated. The range of Fascinac Lacquers include the following finishes:—

**Clear.**—Clear Polishing, a feature of which is the ease with which it speedily polishes to a high lustre.

**Full Flat, and Semi-Gloss.**—These finishes obtained direct from the spray.

**Clear Floor Lacquer.**—A most pleasing finish of great depth that accentuates the natural colour and grain beauty of the timber.

**Colours.**—Semi-Gloss and Full Gloss (direct from the spray). The range of colours is shown on page 227.

In addition to the convenience of quick drying, Fascinac Lacquers possess many valuable properties that

make them definitely superior to other types of finishes.

The surface of Fascinac has a richness peculiar to itself and is highly resistant to heat and moisture. It is harder and less liable to scratch or mark, and does not collect dirt as rapidly as other finishes, and less frequent cleaning is necessary. When the surface does need to be cleaned, it may be washed with soap and water without harmful effect upon the finish. Being practically impervious to steam, hot water and soap, it is ideal for kitchens, bathrooms, lavatories, etc.

Another feature of Fascinac Lacquers (particularly the Clear) is the ability to repair some local damage without showing a patchy effect. The new coat softens the old lacquer and amalgamates with it so that the newly applied portion is practically not noticeable. This is particularly valuable when reconditioning worn parts of floors, such as at doorways where the wear is excessive.







## SECTION I(a)

[Containing S.A.A. Filing Sections Nos. 23 and 26]

### TILES AND GLAZING



(Courtesy of the Australian Tessellated Tile Co. Pty. Ltd.)

#### Tile Treatment of Lift Entrances to Large City Building.

Showing Ceramic Crazy Art Mosaic colour blend of hand-cut Mosaic prepared from tiles manufactured in Bright, Mat, Eggshell Satin Finish Enamels. The Electric Light Column Standards are in Faience Ware together with the application of Satin Finish Art Shaded Tiles.



23a

S.A.A. File No.

# THE AUSTRALIAN TESSELATED TILE CO. PTY. LTD.

Head Office and Works: MITCHAM, VICTORIA  
Phone Ringwood 282

11 QUEEN STREET, MELBOURNE  
Phone Central 2369

Showrooms:

355 GEORGE STREET, SYDNEY  
Phone S.3651

TILES  
FOR  
EVERY  
PURPOSE

## PRODUCTS

*White and Ivory Wall Tiling*—For Glazed Sanitary Work, in 6 x 6 in., 6 x 3 in., etc.

Mouldings, Skirtings, and all Fittings.

*Pavements*—Tesselated, Ceramic, Keramos, Mosaic, Moravian Ware (Colour Blend) and Plain Colours.

*Faience*—Glazed Terra Cotta, Constructional or Veneer.

*Special Tiles*—For Butter Factories, Freezing Works, Confectionery Works, Garages, Dairies, Power and Engine Rooms.

*Tile Dados (Interior and Exterior)*—In Art Shaded, Plain Enamels, Bright Glazes, Matte Glazes, Eggshell Glazes, Antique Glazes.

Decoration and all Fitting Accessories.

*Architraves*—In Faience, Art Shaded and Plain Enamels.

*Treads*—For Stairs and Verandah Kerbing.

*Roofing Tiles*—Estimates supplied. Fixed Complete.

*Alcom Ware*—9 x 6 in., 6 x 6 in., and 4 x 4 in. In Colour Blend Schemes.

*The New Tessla* and Standard Air Pit Fires, Hearths, Fireplace Facings and Majolica Fenders.

*Other Products*—Spanish Fountains, Drinking Bowls, Tested and Un-tested Sanitary Pipes, Urinal Stalls.

### Our Showrooms

A visit will convince you that it contains the finest samples of Glazed Tiles, and is an education of Modern Tile Production which offers suggestions that lend to any atmosphere it needs. Colour combination without limit.

### When Selecting

Inspect our original designs. We are always ready to produce special designs and colour suggestions in Modern and Period schemes.



Illustrated from photograph of Enriched Wall and Colour Blend Ceramic Floor Tiling executed by the Australian Tesselated Tile Co. Pty. Ltd.



Illustrated from photograph of Richly Satin Finished Counter and executed by The Australian Tesselated Tile Co. Pty. Ltd.



Illustration of Entrance Wall Tiling in Antique Colour Blend Blocks with Faience Embossed Frieze and Sanitary Rounded Edge Finish executed by The Australian Tesselated Tile Co. Pty. Ltd.

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HEXAGONAL MOSAIC

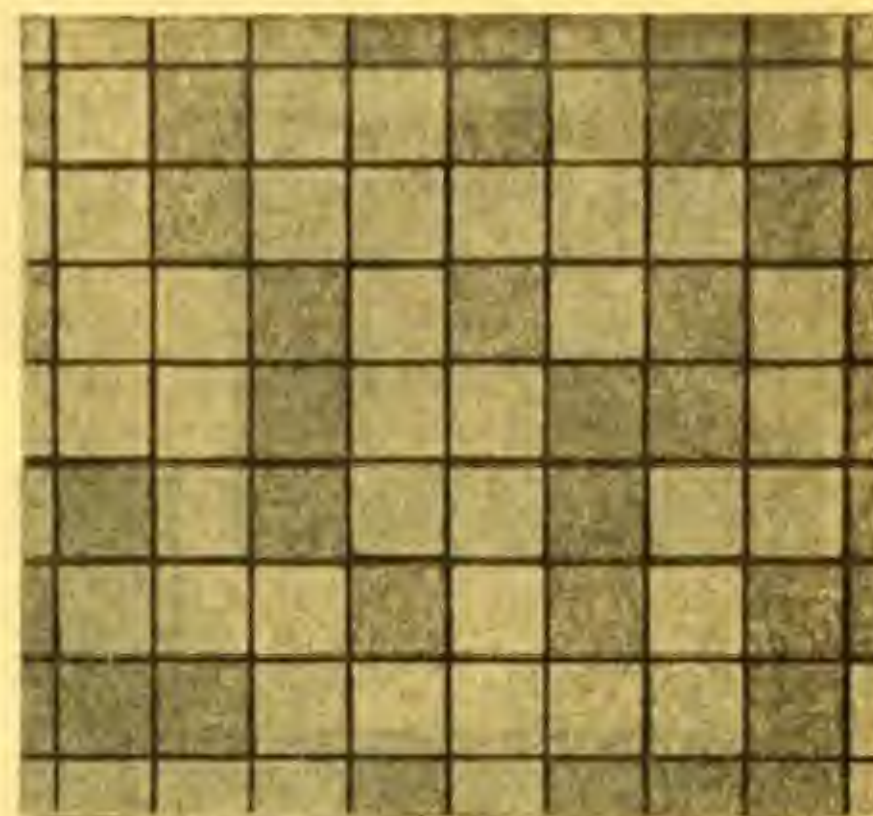
## CERAMIC MOSAIC FLOOR TILING

In 1 in. x 1 in. hexagons,  $\frac{1}{2}$  in. x  $\frac{1}{2}$  in. square and  $\frac{1}{4}$  in. x  $\frac{1}{4}$  in. square, plain or colour blend in white, black, chocolate, arab, buff, salmon, blue, sage green, emerald green, and keramos colours. Also supplied in Chip Mosaic.



MORAVIAN WARE (above)

In 2 in. x 1 in. Colour Blend—used for all classes of interior and exterior tiling.



SQUARE MOSAIC



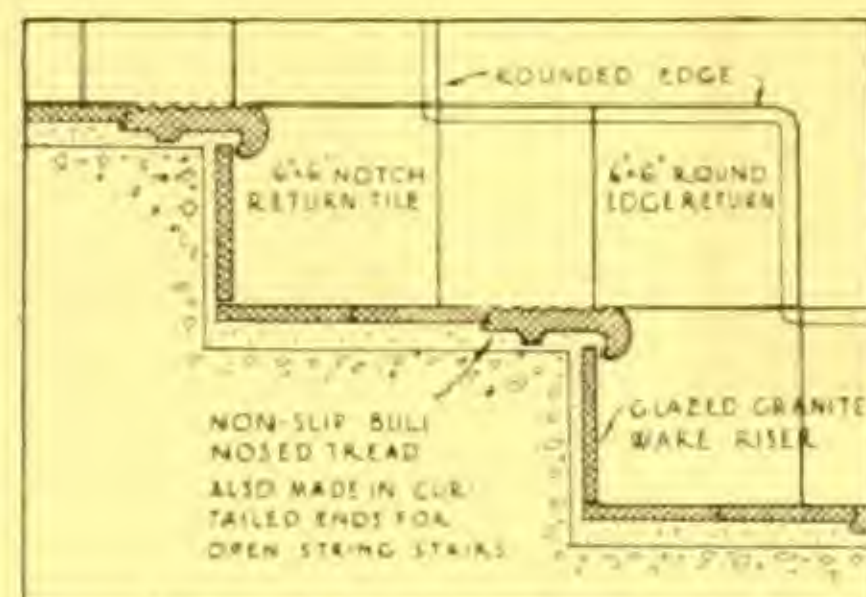
DECORATIVE TILES

Decorative Tiles in Unlimited Designs.

**STAIR TREATMENTS**—Non-slip, bull-nosed stair treads in grooved or plain, with external returns and curtailed ends, used for Stairs, Steps, Verandahs, Kerbing, etc. Manufactured in Keramos Ware, Red and Stone colours. Filling of Treads in Ceramic Mosaic and Keramos Ware to any size; to suit all purposes.

Risers to harmonise in highly glazed Granite Tiles, Bright Glazes, Mat Finish Tesselated features, or same colour scheme as used for Treads.

Skirting in Sanitary Rounded Edge Tiles to harmonise with general treatment.



Modern Tile Stair Treatment.



DECORATIVE TILES

Architects own ideas and colour schemes executed.

## TILING FOR BUTTER FACTORIES—

The standard tiles used for Butter Factories, Freezing Works, and all heavy duty work are manufactured in 6 in. x 6 in. x 1 in. red hexagon tiles together with glazed concave and convex cove tiles to all angles, and the essential stop ends and returns.

Tile Floor Channels are manufactured in glazed and unglazed ware with stop and outlet returns, etc.

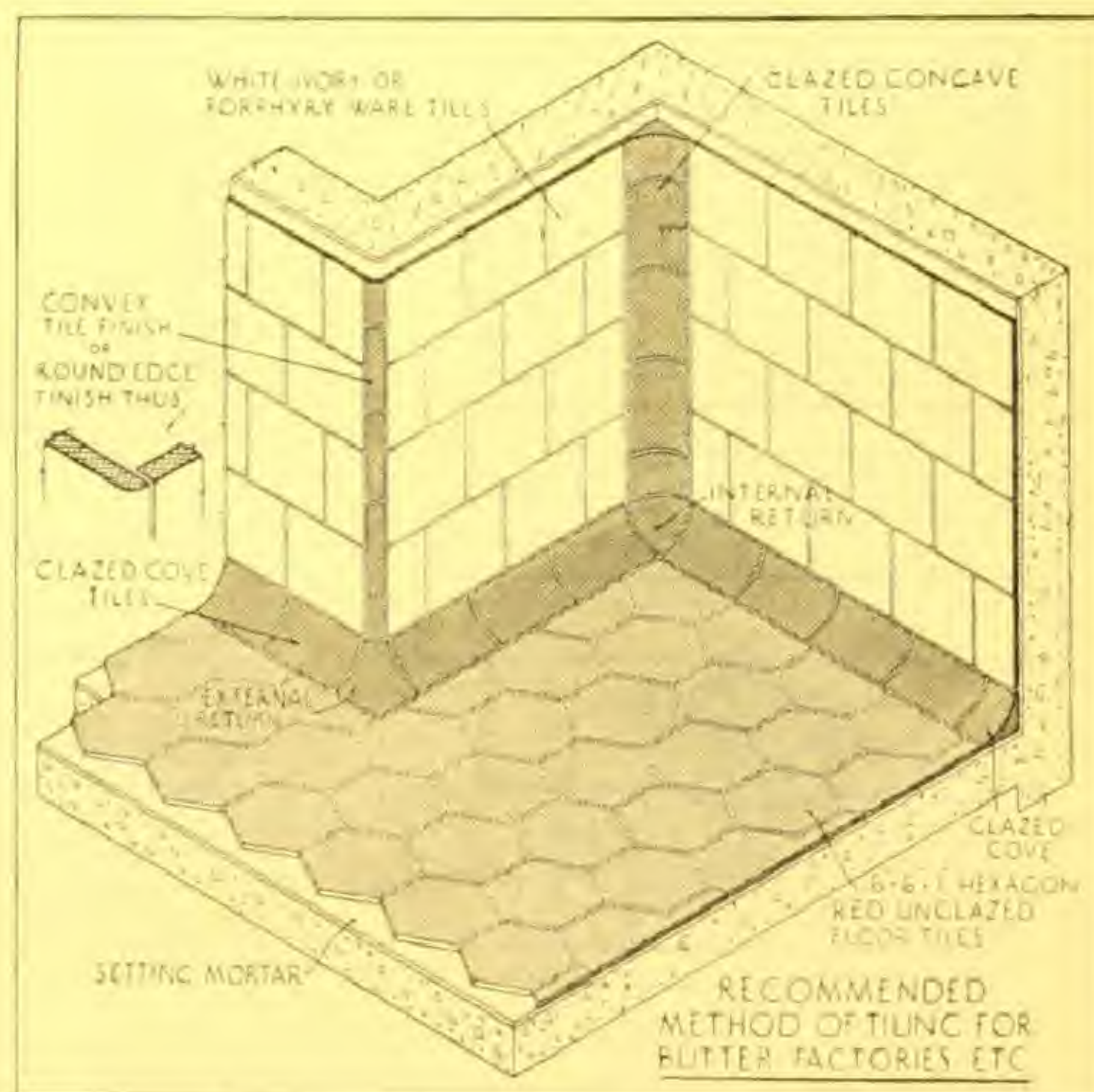
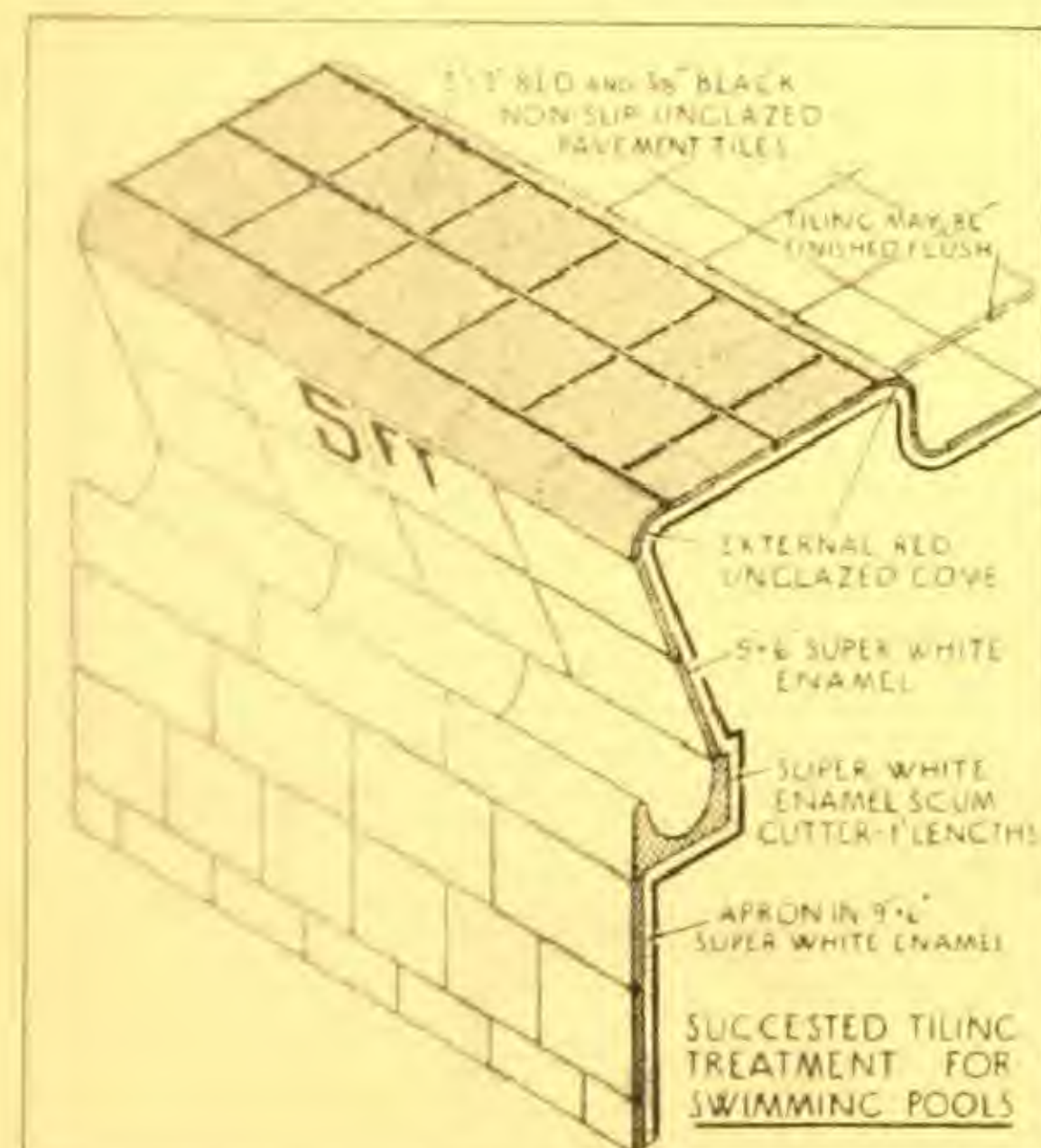
Wall Tiling manufactured in 6 in. x 6 in., 4 in. x 4 in., and 6 in. x 3 in. White, Ivory and Porphyry Ware, with the essential sanitary concave and convex finish.

**SWIMMING POOLS** vary in construction and design. Below is the most favoured application.

The application of "Hold-fast" tiles is essential for use in the floor of the Pool, together with an increased thickness of Coloured and Racing Lane Lines.

Numbers are made in permanent Ceramic glazed in any colour which is non-perishable.

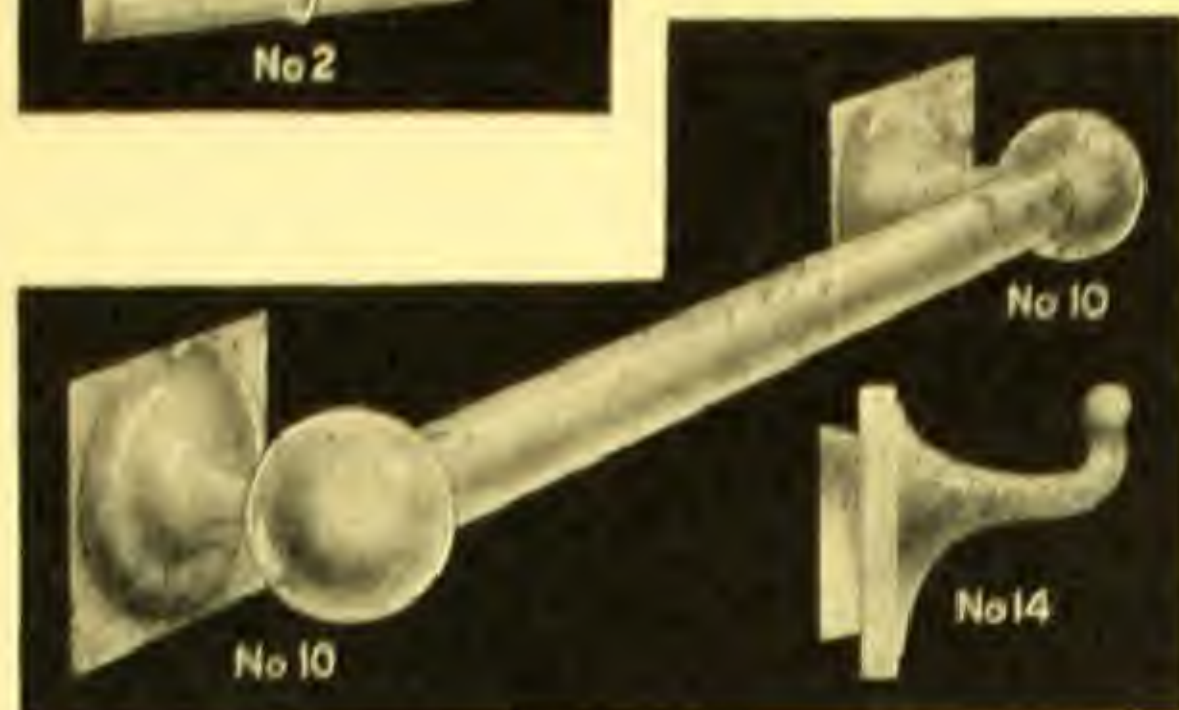
Constructional information upon application.



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(Drawn by the Architectural Staff of Ramsay's Catalogue)





### "Tessla" Wall Fixments

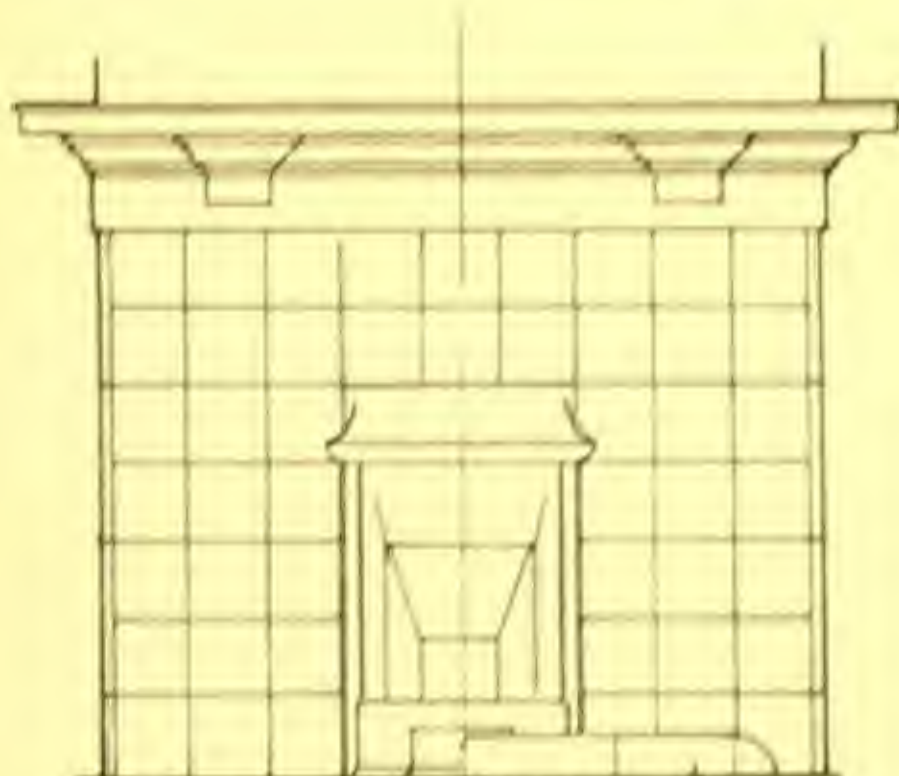
"Tessla" Fixments to match all our glazes in perfect harmony with any desired colour effects are available. For complete range, send for our catalogue. Those illustrated on this page are—

- No. 1—6 in. x 6 in. Soap Holder, with tongued lip.
- No. 2—8 in. x 6 in. Soap Holder, with tongued lip and grip.
- No. 4a—6 in. x 6 in. Toilet Paper Holder, with Hood and Spring Roller of Wood.
- No. 9—Dolphin, 4 in. x 4 in. base.
- No. 10—Towel Rail Brackets for Round Rail, 4 in. x 4 in. base, joint.
- No. 14—Robe Hook, 4 in. x 4 in. base.



### Terra Cotta Roofing Tiles

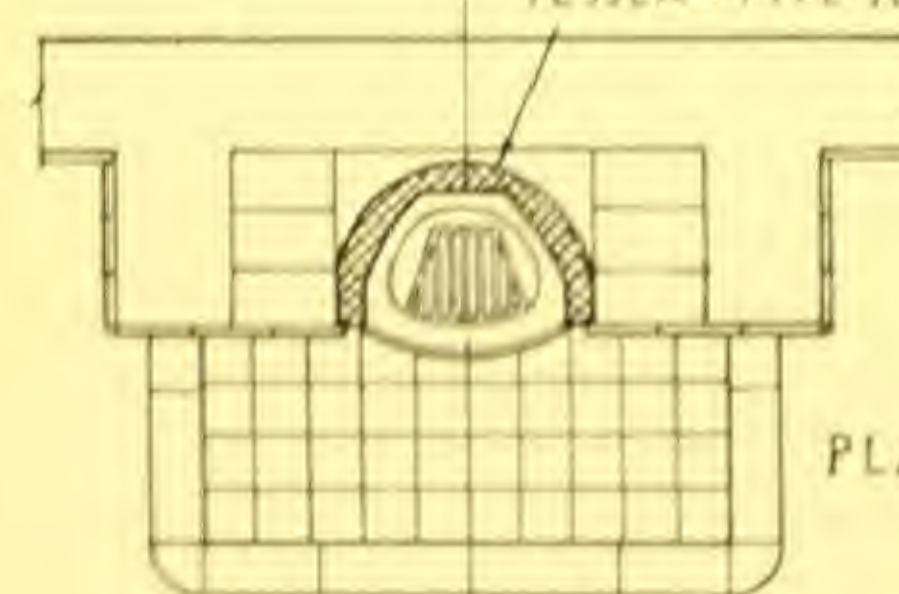
Obtainable in red, chocolate, black, buff, grey, colour blend, glazed or unglazed, ridging, stop ends, etc.



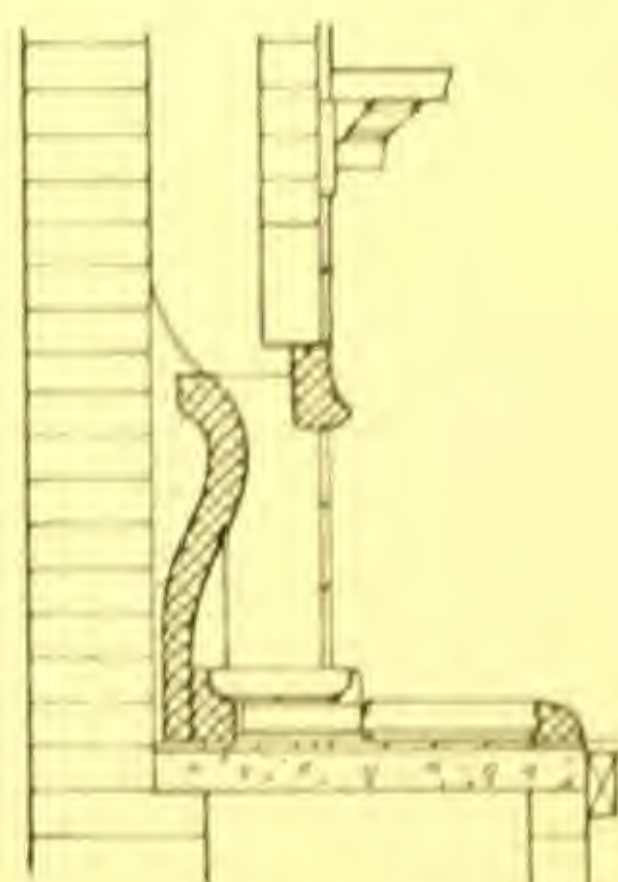
ELEVATION

FENDER

"TESSLA" TYPE "A"



PLAN



SECTION

### "Tessla" Fires

In the manufacture of these "Tessla" Fires, consideration has been given to radiation of heat, economy of fuel, cleanliness, control of combustion, and decorative effect. The tile surround may be selected in any colour.

### Sanitary Pipes

Manufactured in all sizes and material to conform with Metropolitan Board of Works requirements and test.

### Urinal Stalls

Manufactured in stoneware, glazed, can be supplied in single or any range, with channels, straight, stop ends and outlets.



ELEVATION



PLAN



SECTION



26a

S.A.A. File No.

## GLASS AND GLAZING

(Prepared by the Architectural Staff of Ramsay's Catalogue  
from Authentic Sources)

26b

S.A.A. File No.

## CLASSIFICATION OF GLASS AVAILABLE IN AUSTRALIA

## 1. SHEET GLASS.

Plain sheet glass.  
Fluted glass.  
Muffled glass.  
Ground glass.  
Cathedral glass.  
Heat-resisting glass.

## 2. CROWN SHEET GLASS.

(Not generally stocked, but  
can be imported.)

## 3. PATENT PLATE GLASS.

(Not generally stocked.)

## 4. POLISHED PLATE GLASS.

Polished plate.

Wired plate, hexagon mesh.

Wired plate, square mesh.

Wired plate, single wire.

Coloured plate.

Safety plate.

## 5. ROLLED GLASS.

Figured rolled.

Patent rolled plate.

Rough cast plate.

Rough cast plate, wired.

Patent rolled plate, wired.

Prismatic plate.

## 6. COLOURED GLASS.

Sheet.

Cathedral rolled.

Figured rolled.

## SHEET GLASS.

Plain Sheet Glass is graded into four different qualities in accordance with the freedom from imperfections found in the various sheets. Australian standard is "thirds" quality. Some of the inferior qualities reach Australia in the guise of "thirds."

"Seconds" and "first" quality are also used in better class jobs, but the architect should not expect a plate glass appearance from even "first" quality.

One-eighth plate glass can be obtained up to two super ft. at a cost of a few pence per super ft. more.

Sheet glass is obtainable in sheets with maximum limits of length, breadth and area corresponding to weights per super ft., as follows:—

16oz.—up to 50in. x 36in.—  
Extreme length—60in.  
Extreme width—36in.  
Extreme area—14 sq. ft. approx.  
21oz.—up to 60in. x 44in.—  
Extreme length—72in.  
Extreme width—44in.  
Extreme area—21 sq. ft.  
26oz.—up to 72in. x 48in.—  
Extreme length—72in.  
Extreme width—48in.  
Extreme area—24 sq. ft.

It will be noted that the extreme length and width cannot, in all cases, be combined in the same sheet.

Fluted Glass is blown to form corrugations (wide or narrow) both sides of the sheet. The fluting strengthens the sheet, and secures greater privacy with less loss of light than other forms of obscured glass. It can be obtained in 1/10th in. thicknesses and sheets not over 56 inches long or 36 inches wide.

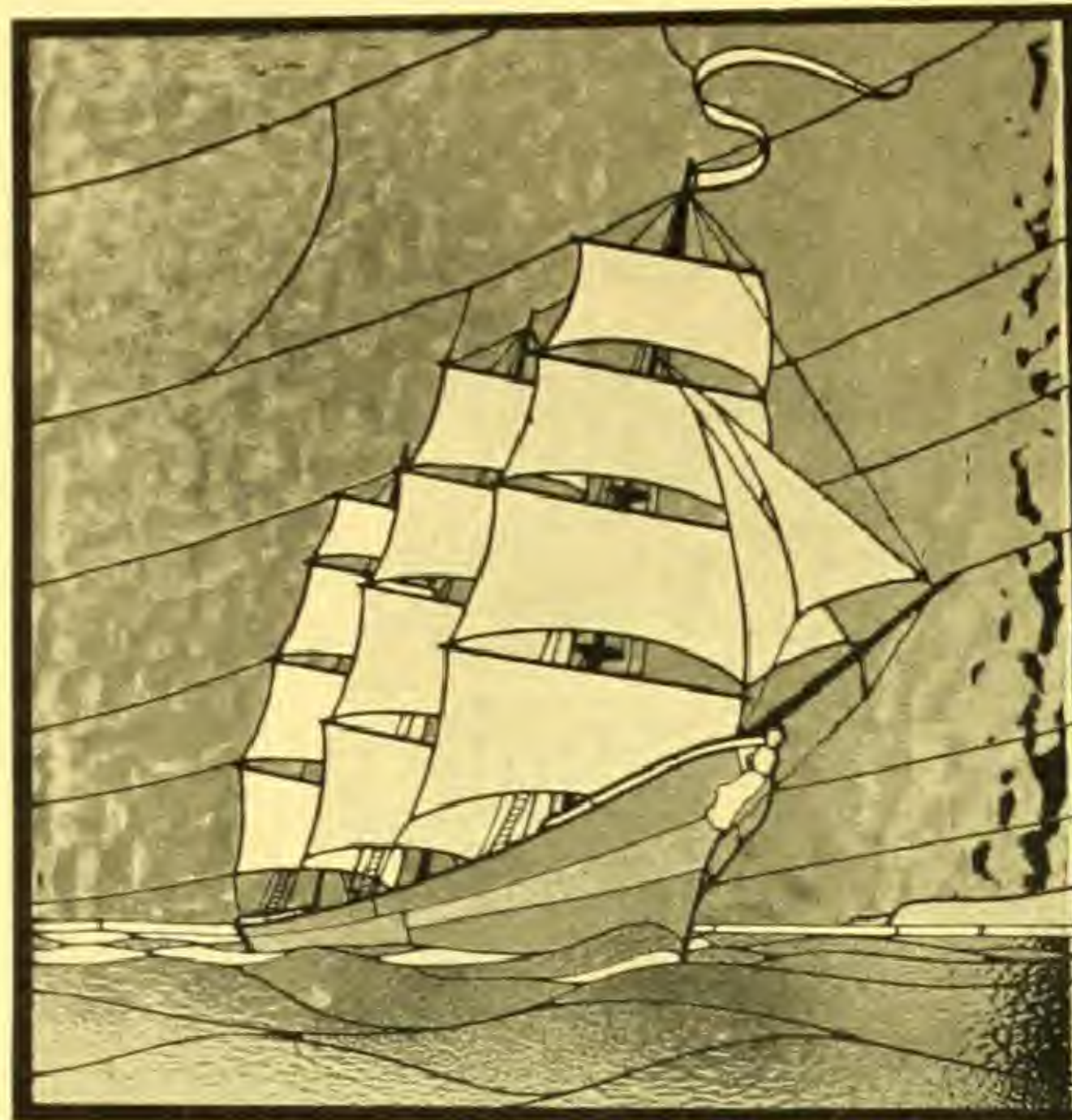
Muffled sheet is somewhat similar.

## PLATE GLASS.

Polished Plate is the best quality plate glass obtainable, and is available in sheets up to 240 feet super., or 240 inches long, or 144 inches wide. The standard and cheapest substance is 1-in. in thickness—this varies, as provided by the makers, from full 3/16th in. to bare 5/16th in., hence an exact 1-in. should not be expected.

Also available in 5/16th in. and 2-in. thicknesses.

3/16th in. thick costs more than 1/2 in.  
1/2 in. thick costs more than 3/16th in.  
1/10th in. thick costs more than 1/2 in.



(Courtesy of Brooks, Robinson & Co. Ltd.)

An extremely effective design through the use of  
Figured Glass.

Sky—Flemish; Sails—Arched Flemish; Hull—Pinhead  
Morocco; Water—Muffled.

efficient glazing for skylights, etc. It also complies with the Fire Underwriters' requirements.

Rough Cast Plate is the cheapest quality of plate glass, and is supplied in 3/16th in. and 1/2 in. thicknesses, and in sheets up to 120 in. x 40 in. This glass is principally used in warehouse, workshop and factory window and skylight glazing when light but not clarity of vision is wanted.

PUTTY.—Putty for wood glazing is made from raw linseed oil and powdered whiting—it should be free from gritty particles or stickiness.

Ordinary glazing putty is not suitable for glazing metal frames, as the frame will not absorb the excess quantity of oil. A minimum amount of linseed oil should be used with the whiting, and red lead or litharge added in sufficient quantity to assist quick setting. Mastic cement, especially prepared for glazing metal frames, is available.

## SPECIFICATION FOR GLAZING

(For Use Primarily in the Residential Job)

## MATERIALS.

SHEET GLASS shall be plain sheet, 21 oz. (26 oz.) Australian standard.

PLATE GLASS shall be 1/2 in. (1/2 in. or . . . . .) thick polished plate glass. Where bevelling is called for, it shall be 1 in. (1 1/2 in.) wide and on one side only. (Describe any special finishes in a later schedule.)

## OBSCURED OR OTHER GLASS

(Describe type of glass to be used and refer to later schedule for location.)

PUTTY.—Linseed oil putty shall be used in wood frames, and metallic or mastic putty in metal frames.

## WORKMANSHIP.

GLAZING—WOOD FRAMES.—All glass shall be well

bedded and back-puttied, and shall be sprigged where necessary.

Where wood beads are needed to secure the glass, it shall be back-puttied.

GLAZING—METAL FRAMES.—All glass shall be well bedded and back-puttied. Set all glass in . . . . . mastic putty.

COMPLETION.—Carefully trim and clean off all putty on completion.

Take out and renew all cracked, damaged, scratched or defective glazing, and leave all glazing sound and perfect at completion.

(A schedule of all glazed areas with types and finishes of glass should follow.)



<div>26b</div> <div>S.A.A. File No.</div>	<div> <h1>BROOKS, ROBINSON &amp; Co. LTD.</h1> <h2>SHOP FITTERS</h2> </div> <div> <p>ELIZABETH STREET, MELBOURNE WORKS: MAFFRA STREET, SOUTH MELBOURNE Telephone M 3131 (5 lines)</p> </div>	<div>B-R</div>
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[For Other Products, See Pages 70, 95, 141, 172 and 468]

## SHOP FRONTS

### Shop Front Design

The design and planning of a shop front must be considered in conjunction with the type of merchandise to be displayed together with a study of the locality of the business.

The shop front should be the definite introduction between the buyer and the seller, and for this reason alone the most careful consideration should be devoted to its design and planning.

Brooks, Robinson & Co. Ltd., who have specialised along these lines for many years, offer their services to Architects with regard to the design and planning of the successful shop front.

### Materials

The choice of materials used in shop front manufacture is also another item for consideration. The framing consisting of:

1. Wood.
2. Metal sheathed wood.
3. Extruded metal.
4. Any one of the above in combination with castings, stampings, or enamels.

1. In a wood shop front with small mouldings the timber must be well seasoned, the joints correctly designed and carefully manufactured, and this work can only be satisfactorily made by the expert and reliable shop-fitter. Wood shop front mouldings must be periodically varnished or polished to keep the timber in condition, and in no circumstance should this important work of conditioning be neglected.

2. Metal-sheathed mouldings are made in copper, bronze, brass, white metal, aluminium, and many other alloys as well as in stainless steel. These metals, except the last, need constant cleaning and polishing if they are to be kept bright, but it is far better to let the metals oxidise naturally, or to have them chemically oxidised by an expert, and then to clean them with warm water and occasionally the use of a little oil.

3. Extruded metal mouldings are coming more into use on account of the fine arrisses and clean-cut mouldings that can be made. It is more expensive, but can be used with success in combination with the before-mentioned mouldings under 1 and 2.

4. Castings and stampings are often used as capitals and bases for upright bars in shop fronts, as well as for design and relief in a wide transom.

Enamel may be used in combination with cast caps and bases or with cast transom ornament, giving tone and distinction to shop front design.

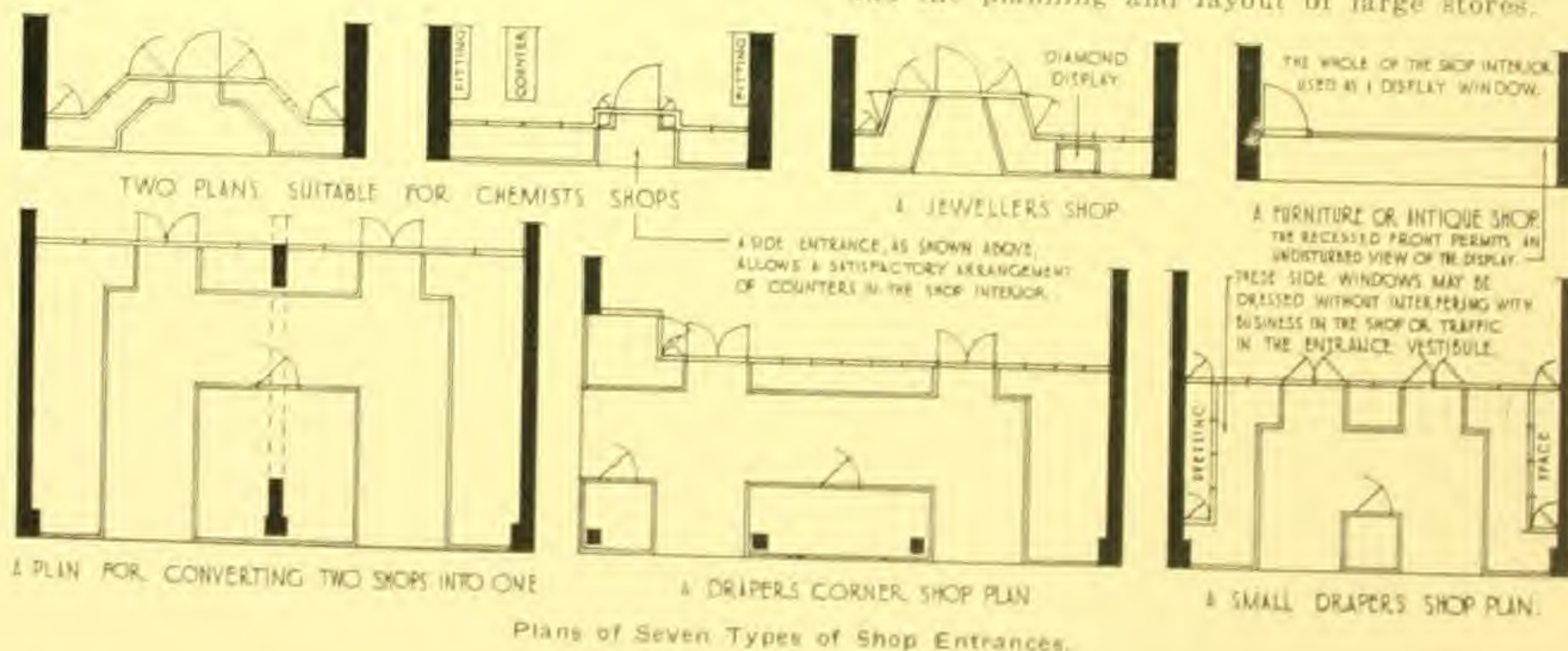
Brooks, Robinson & Co. Ltd. manufacture shop fronts in all these materials, having numerous sections for selection, but Architects' designs can be carried out and dies made for any special work.



A typical Metal Shop Front Installation by Brooks, Robinson.

### Other Products

Brooks, Robinson & Co. Ltd. also manufacture counters, fixtures, showcases and all fittings required for the modern store. Their designing staff are at all times at the service of Architects both for shop fronts and the planning and layout of large stores.



Plans of Seven Types of Shop Entrances.



**"LUXFER" COPPER GLAZING****What Luxfer Copper Glazing is**

Luxfer Copper Glazing is a patented process in which pieces of glass are clamped up into panels of the required design, having only thin strips of copper between the pieces of glass. The panel is then suspended in an electrolyte, and by the passage of an electric current, copper is deposited on the copper strips and extends over the glass, forming a glazing head in intimate contact with the glass.

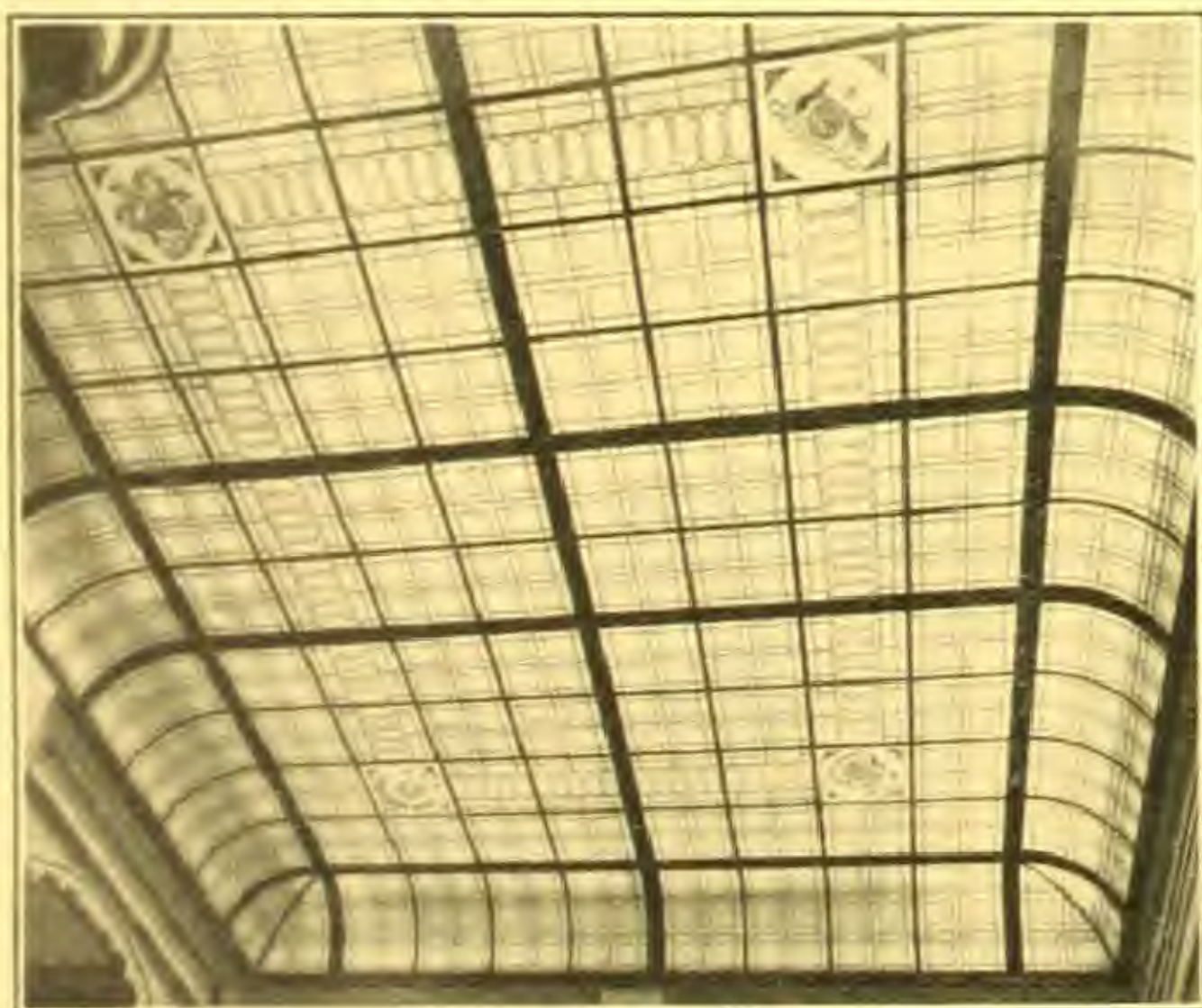


Dome, Queen's Walk, Melbourne.

**Advantages**

The "Luxfer" form of copper glazing produces a very neat panel, having small copper glazing bars which are very strong and heat-resistant.

As there are no low-melting point or combustible materials used in the construction of the panel, and because of the strength of the copper glazing, the "Luxfer" Copper-glazed Panel will resist fire without disintegrating until either the glass melts or the frame holding the panel collapses, and although the glass itself may crack, the pieces will remain rigidly in position, held by the copper glazing.



E.S. &amp; A. Bank, Collins Street, Melbourne.

**Fire Underwriters' Approval**

As a result of satisfactory fire tests made in Great Britain, America and on the Continent, panels of stained, plain or prismatic glasses glazed under "Luxfer" patents were found to be extraordinarily fire-resistant, and as such this glazing has been approved by the Fire Underwriters for fire-resisting construction.

**Selection of Glass and Applications**

Almost any form of figured, plain, prismatic, stained or plateglass or combinations to form patterns may be glazed by the "Luxfer" Copper-glazing method.

As illustrated, this copper glazing may be applied to domes, ceilings and entrance doorways. Other applications include lift doors, partitions and partition doors, fanlights, windows; and, in fact, in any position requiring an ornamental and fireproof glazing.

**FIRE UNDERWRITERS' SPECIFICATION.**

Glass used should not be less than  $\frac{1}{4}$ -in. thick, no piece of glass should exceed 16 sq. inches area, and no panel should exceed 5 sq. feet area—this to comply with Fire Underwriters' Association.

Brooks, Robinson & Co. Ltd. have the sole rights to manufacture Luxfer Glazing in Australia, and it is the only glazing that has been approved and accepted all over the world. Luxfer Fire-resisting Glazing never varies in quality and is the perfect manufacture.



Doors, Hotel Windsor, Melbourne.



26b

S.A.A. File No.

ESTABLISHED 1892

## T. S. GILL &amp; SON PTY. LTD.

672-684 CHAPEL STREET, SOUTH YARRA  
MELBOURNE

GILL

PHONE: WINDSOR 8000

STORE  
FRONTS"CUPROS"  
GLAZING

[For Other Products, See Pages 147 and 174]

## Products

Store Fronts in Metal or Wood, "Cupros" Fire-Resisting Glazing, Lead and Copper Glazing.

## Store Fronts

Store Fronts in any class of metal or timber, either to Architects' drawings, or, when requested, we are prepared to submit designs, prepared under Architects' directions.

## Co-operative Service

We carry a library of the latest European and American literature dealing with this class of work, which, if required, is at the Architects' disposal.



Store Front, Francis House, Melbourne.  
By T. S. Gill & Son Pty. Ltd. Architects: Blackett & Forster.

## Essential Points in Store Front Construction

The brief notes on this and the following page have been prepared with the object of placing before the Architect such information which will enable him to clearly perceive the essential points necessary in good shop front construction methods. Such methods are employed by T. S. Gill & Sons Pty. Ltd., whose years of experience authorises them to present this information.

The life of a metal store front, if constructed to these particulars, is practically that of the building. Further, no maintenance cost is necessary in the shape of painting or polishing.

## STORE FRONT CONSTRUCTION

## Metal Work

The gauge metal that should be used is 20 ozs. to the square foot. This should be drawn on to a wooden core, the core being made of either selected yellow or sugar pine, the edges of the metal being pressed into the core, as shown in Fig. 1. Where the desired finish is "bright," the mouldings should be polished on a high-speed mop or buffing machine. In the case where copper or Muntz metal is used, and an oxidised finish is desired, the moulds should be cleaned with a fine emery powder and then oxidised. The sill mould should be of a suitable section to take the stiles and angle bars. There may be one or two transoms to suit any given design or varying heights. The tops of all transoms should be flashed with either a light-gauge copper or 26-gauge galvanised iron.

## Method of Metal Construction

All internal and external mitres in the metal work should be accurately fitted and loaded from the back and then sweated from the front, thus securing an absolute joint. All vertical bars should be tenoned into the horizontals and then loaded and sweated as before. Where the frontage is of too great a length to be glazed with one plate, the division bar should be reinforced with a wrought-iron stiffener, with cross members at the sill, transom and head. We advise no plate longer than 144 inches or higher than 96 inches.

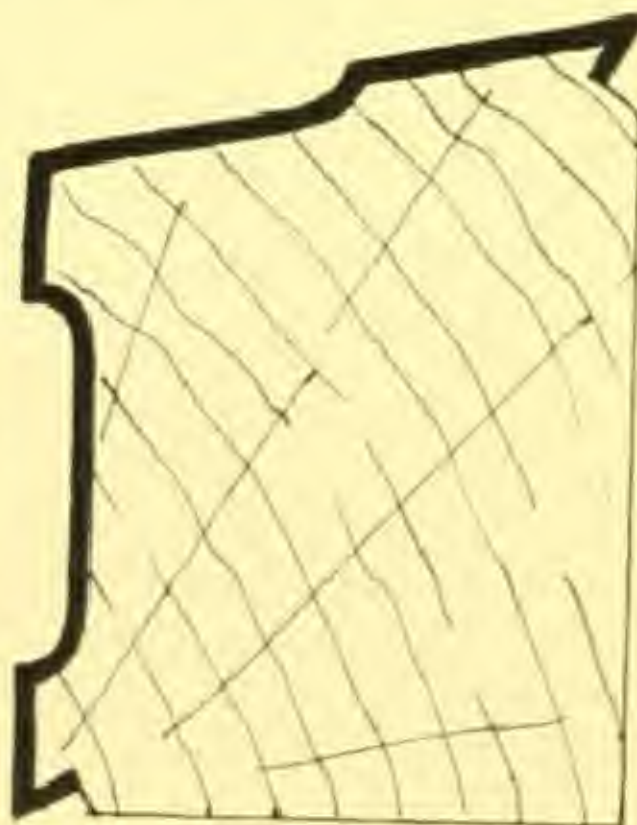


Fig. 1—Typical Section of Metal Mould.

## Glazing

Between the sill and first transom, the glazing should be in 1/4-inch polished plate-glass. Between first and second transom, or between transom and head, various glass treatments may be used, either leaded glass, copper glazing, embossed or blasted glass, or any of the various figured rolled glasses now obtainable.

## Method of Glazing

All glass should be cut about 1/16th in. less than the opening to be glazed. All rebates should receive a good bed of soft, quick-drying putty. The glass should be forced tightly against this bedding to squeeze out all surplus material. This should be cleaned off from the face and any cavities should be filled up, thus securing an absolutely watertight joint. The glass should then be secured in position with glazing beads, which should be screwed to the frame. (See Fig. 2.) Where "angle" bars occur, great care should be taken to see that the glazing bead is made on the correct angle, thus forcing the glass tight into the bed and making a dovetail joint.



Fig. 2—Typical Section of Shop Front Frame.

(Continued on next page.)



### Pier Cases

Owing to the high value placed upon all main street frontages, every inch of available space is utilised for display purposes, hence the advent of the pier case.

The framework of a pier case, to comply with the building regulations, must be in metal. Its projection beyond the building line is limited to  $4\frac{1}{2}$  in., and no projections below 9 feet from the footpath, or more than  $\frac{1}{2}$  in. in front of the glass is allowed by the municipal authorities. Great accuracy is necessary in the construction of a pier case, as the front and returns open as a door. (See Fig. 3.)

The framework should be of metal to match the store front, the front and two returns being glazed with plate-glass. The back must be framed up, as on this depends the strength and strain of the door. This back may be either faced with a polished ply-wood panel or with a mirror, as desired.

The method of hanging the door of a pier case is to extend one wing of the hinges so that it extends well across the framed back already referred to. Both hanging and closing stile of the door should be grooved to fit over a tongue in the back, to keep the case dust-proof. A similar method should be adopted for both the top and bottom of the door.

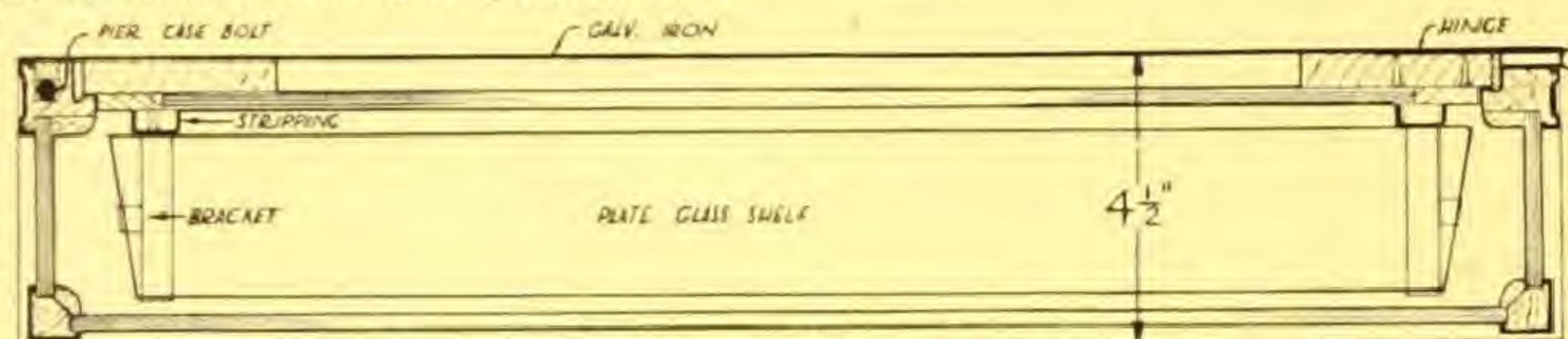


Fig. 3—Pier Case Construction.

### Locking Apparatus

A good quality Mortise Dead-lock should be sunk into the bottom of the case, the bolt to shoot into the bottom rail of the door; the closing stile of the door should be built hollow. Into this hollow a  $\frac{3}{16}$ -inch steel bolt is inserted, with a cone-shaped base. When the door is being closed, the cone strikes a metal ramp (see Fig. 4), which forces the bolt upwards into a holed metal plate made to receive it. By this method, the door is absolutely secure at both the top and bottom. A wrought-iron arm is necessary at the bottom of the case, to prevent the door opening beyond the square and probably breaking the window. Adjustable fittings, adapted to carry either glass shelves or rods for dressing, may be used.

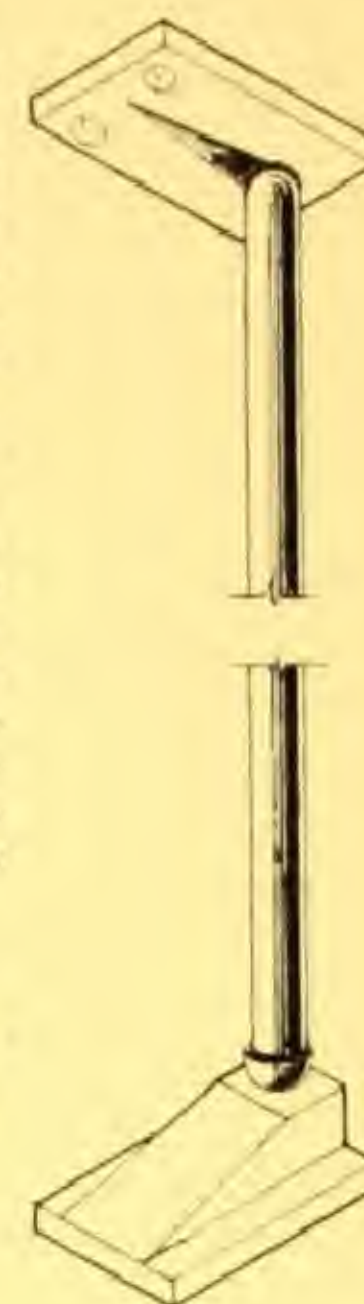


Fig. 4.  
Pier Case Bolt.

### "CUPROS" AND DOMESTIC COPPER GLAZING

#### "Cupros" Copper Glazing

"CUPROS," or Copper Glazing, is a comparatively new process, superseding, in the first instance, the ordinary lead-light glass.

#### Method of Manufacture

"CUPROS" Glazing lends itself to any design that may be desired. The pattern is sketched full size as for leaded glass, but, in place of the lead strips, 26-gauge copper is used as a divide between the various glasses. A "U" section is used for the outside member, and, where a large expanse of glass is required, "H" sections of various sizes are introduced. When the whole is cut and assembled, the work is transferred into a copper bath and is there treated for varying periods from six to fourteen hours, according to the nature of the work. The copper deposit collected on the various sections forms a rebate for the glass, and the panel, when finished, forms practically a solid mass. (See Fig. 5.)

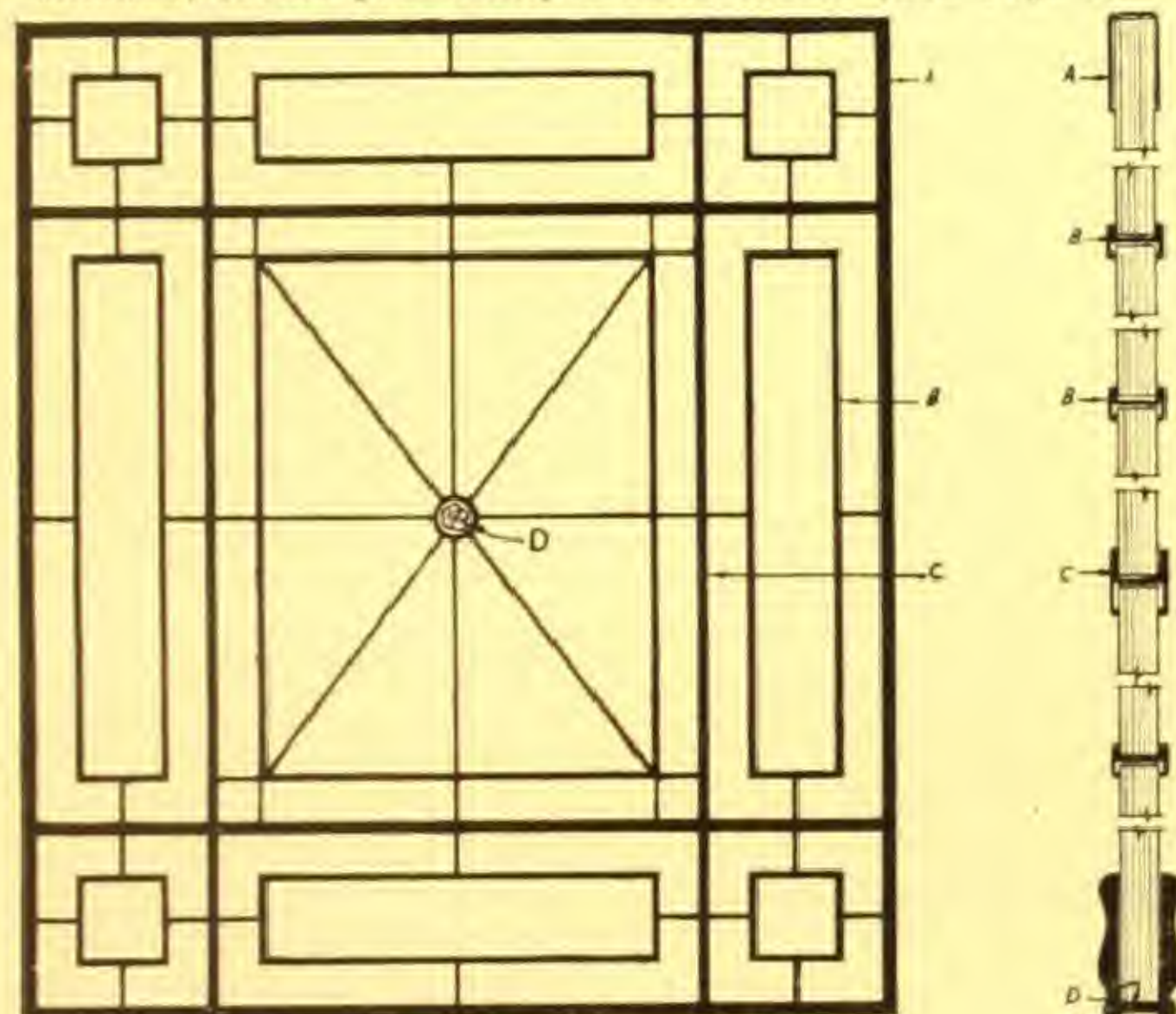


Fig. 5—"Cupros" Glazing.

#### "Cupros" Fireproof Glass

This is in all respects similar to the above, and is accepted by the municipal authorities as "fire-resisting." In this work, no individual piece of glass must exceed an aggregate of 16 in. and no separate panel must exceed 4 ft. super face measurements. For this class of work, all glass used must be a minimum of  $\frac{1}{4}$ -in. thick.

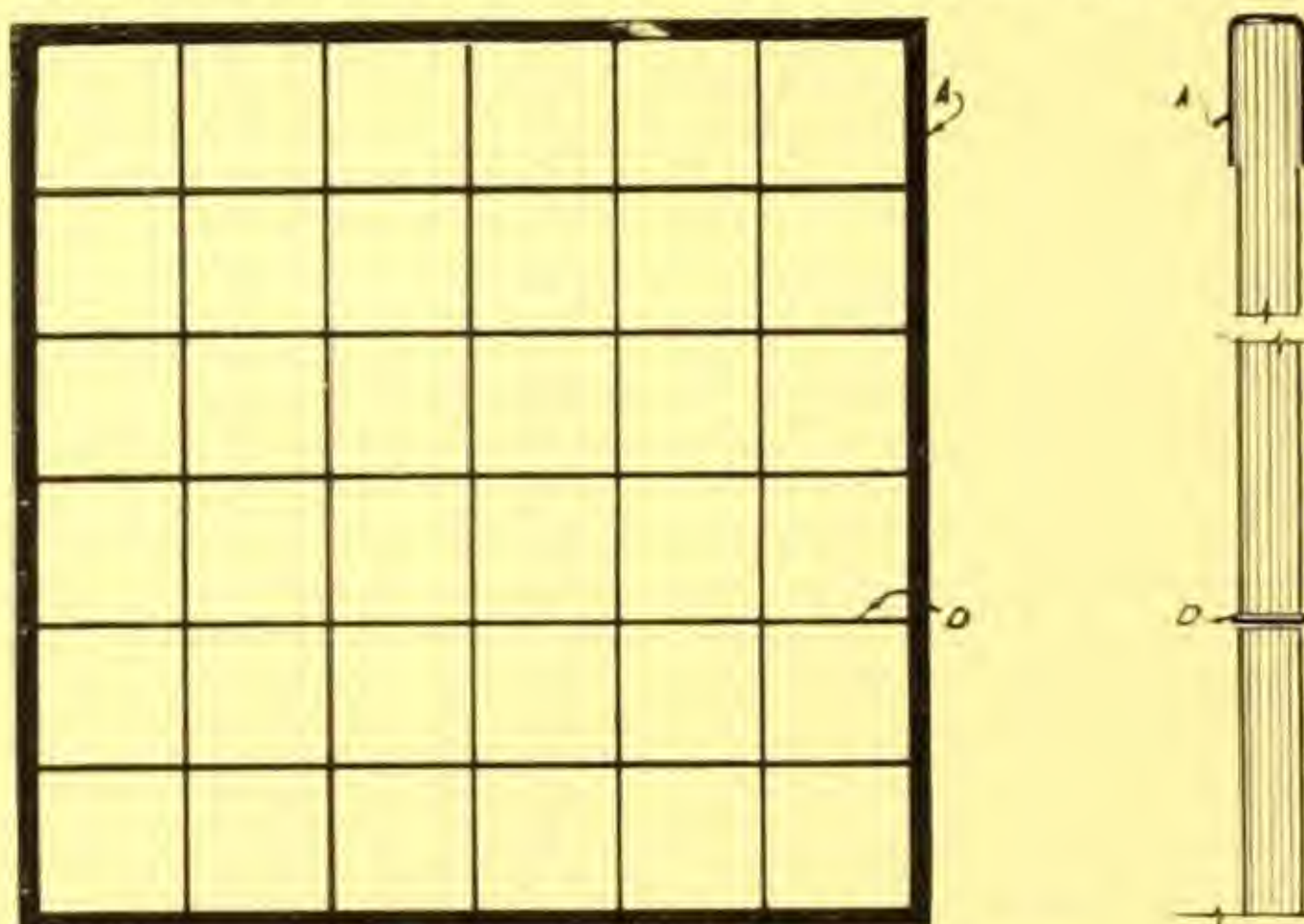


Fig. 6—Fire-resisting "Cupros" Glazing.

#### Domestic Copper Glazing

For domestic Architecture, this class of glazing is pre-eminent. It lends itself to much more artistic work, and, if in use for outer doors and side lights, is much more burglar-proof than leaded glass, the latter being readily opened by forcing the soft lead and removing any number of pieces of glass.



26b	<b>WUNDERLICH LIMITED</b>		
	Manufacturers of <b>Wunderglaze (Electro-Copper Glazing)</b> Administration: BAPTIST STREET, REDFERN, SYDNEY, N.S.W. Showrooms and Offices: SYDNEY: Baptist Street, Redfern. STH. MELBOURNE: 210 Hanna Street. ADELAIDE: Grote and Morphett Streets. PERTH: Lord and Short Streets. BRISBANE: Amelia Street, Valley. NEWCASTLE: Builders' Exchange, King St. HOBART: 139 Macquarie Street. LAUNCESTON: 71 St. John Street.		

[For Other Products, See Pages 22, 55, 93, 102, 104 and 176]

### Description

Wunderglaze is the trade name for Wunderlich Electro-Copper Glazing, made by improved method, assuring an unusually heavy copper deposit and utmost rigidity in the finished panels.

It is composed of selected glasses, fabricated into various designs (usually geometrical) by copper comes (i.e., division strips), of I, H and channel sections, which are electrolytically deposited into intimate adhesion with the glass; forming a close-fitting rebate around the quarries and holding them rigidly in position; with the result that the panel thus built up is virtually one homogeneous whole.

### Applications

The use of Electro-Copper Glazing (Wunderglaze) is essential—in fact, compulsory—in many cases, such as lift doors and enclosures; and its employment is eminently desirable for the glazing of door panels, fanlights, windows, light wells, partitions and ceiling lights in city buildings; and of door panels, windows, bookcases and cupboards in dwellings.

### Strength and Durability

Being united, by electro-copper depositing, into a rigid panel, Wunderglaze is not subject to distortion. Its inherent strength renders it capable of resisting rough usage, as when employed for door panels or window sashes. Unlike other types of glazing, it does not require strengthening rods, with their unsightly wire ties.

### Fire-Resisting Glazing

Wunderglaze for elevator doors, fireproof partitions and similar purposes, if made to the requirements of the Fire Underwriters, is accepted as an approved fire-resistant and samples made to this specification have been

tested to withstand a temperature of 1750 degrees Fahr., without "breaking down." The regulations insist that Wunderglaze fireproof door panels shall be limited to 4 square feet in area, with quarries not exceeding 16 square inches; but if it is required to glaze larger panels, this can be effected by subdividing the area with Wunderlich approved section reinforcement bars.

### Use of Colour

A deliberate exploitation of colour is not always essential to an attractive Wunderglaze treatment, since effects of utmost charm and refinement may be attained by the tasteful blending of the textures of the component glasses. But if the occasion calls for a scheme of colouring, the resources for this purpose are unlimited, embracing as they do the entire gamut of subtle tints so exclusive to glass, as well as the more dominant and brilliant hues. In its refined setting of thin copper comes, a scheme of colouring acquires enhanced charm when carried out in Wunderglaze.

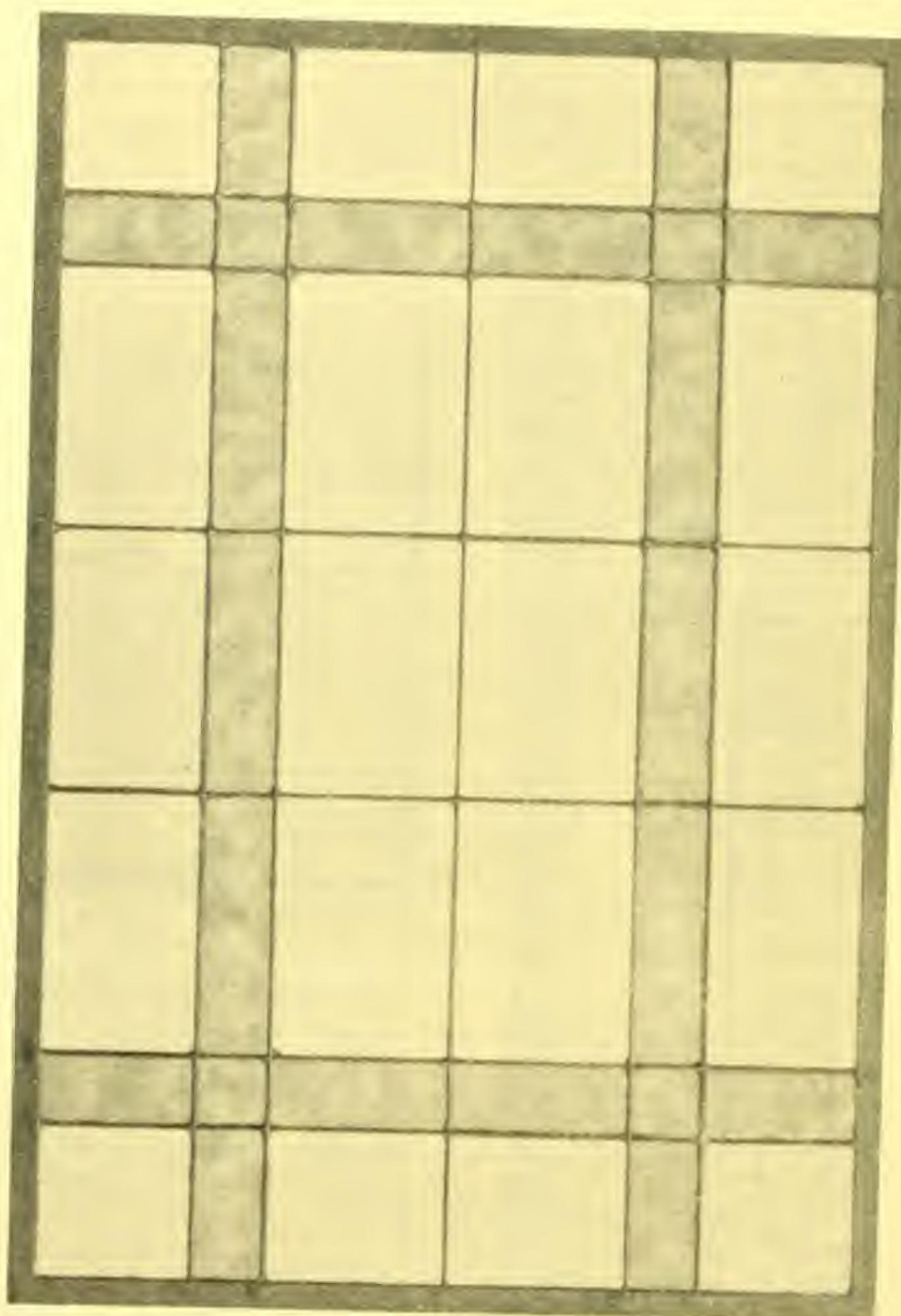
### Wunderglaze Designs

A review of the method of fabrication at once demonstrates that Wunderglaze offers scope for unrestricted variety in design; but as a guide to correct practice, and to provide a basis for prices, we have produced a useful range of standard designs. Blue Prints displaying these will be furnished, free of charge, on request.

The services of our Art Department, with its trained designers and technical experts, are always at the disposal of clients, to assist them in the preparation of designs, to suggest appropriate treatments, or to advise as to the proper selection of glasses.

### Display of Samples

Sample Panels of Wunderglaze are display in our Showrooms in each State (see addresses above).



Refinement of line is a feature of Wunderglaze, this being due to the thinness of the rigid copper comes (division bars).



# SECTION J

[Containing S.A.A. Filing Section No. 27]

## HARDWARE





<p><b>27a</b></p> <p>S.A.A. File No.</p>	<p style="text-align: center;"><b>GEO. KINNEAR &amp; SONS PTY. LTD.</b></p> <p style="text-align: center;">Warehouse: 114 KING STREET, MELBOURNE.</p> <p style="text-align: center;">Factory: 110 BALLARAT ROAD, FOOTSCRAY, VIC.</p> <p style="text-align: center;">Depots At:</p> <p>SYDNEY: O. Pendergast &amp; Co., 416 Kent St.</p> <p>ADELAIDE: A. Murdoch &amp; Co., Charles St.</p> <p>BRISBANE: B. J. Ball (Q'land.) Ltd., Charlotte St.</p> <p>TASMANIA: All Merchants.</p>	<p style="text-align: center;"><b>"EMU" BRAND</b></p>
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### Products

Manufacturers of all kinds and sizes of "Emu" brand Braided and Plaited Cotton, Jute and Hemp Sash Cords; Venetian and Verandah Blind Cords; Scaffolding Ropes and all Building and General Ropes.

### "Emu" Brand

The Trade Mark is illustrated by an Emu standing on a coil of Rope with the words "Emu Brand" above the design. The wrapper on all coils or hanks of sash cord bear this Trade Mark as a guarantee of quality and service.

### Braided Cords

It has been found that cord can be braided too hard for durability, yet if it is braided so as to be very flexible it may be so soft that it will stretch and cause great annoyance by permitting the sash weight to hit the bottom of the weight box. These defects are completely overcome in the manufacture of "Emu" Brand Braided Cords. First, the cord is braided of cotton, being the only fibre that will stand constant bending over a pulley; secondly, our process of finishing takes up all the stretch and thus the cord does not lengthen by wear, but maintains the sash weight at its correct height.

Other features of "Emu" Brand Braided Cotton Cord is its inability to jam in the sash pulley and its smoothness of running, thus precluding all possibility of broken sash cords.

We manufacture cheaper cords of jute; these are used where price is the first consideration, but we recommend that in all first-class work braided cotton cord be used because of its longer life and freedom from potential troubles.

### How Available

Emu Brand Cotton (Braided) Sash Cord is made in 8 standard sizes and may be had in hanks each 36 feet in length (6 hanks connected) or in reels with cardboard centre up to 28 lbs., or in any size coil up to 1 cwt., in one continuous length.



### Guarantee

We will extend to every architect who specifies (as in the specification set out below) "Emu" Brand Cotton (Braided) Sash Cord a certificate of guarantee against the breakage of the cord for a period of ten years after installation.

### Samples

Sample card showing the various sizes and grades of sash and blind cords, together with price lists, will be gladly sent on request to architects and builders.

### Special Cords

Cords can be made to order for any purpose in any special colour or size or type.

### Estimates

Estimates will be gladly furnished on request for any specification for cord.

### Blind Cords

Plaited cotton Venetian Blind Cord is also made by us and stocked in four weights of 2, 2½, 3 and 4 lbs. per gross yards. For Verandah Blind use "Emu" Brand Plaited Cotton Cord, made in five sizes, as follows: ½ in., ¾ in., 1 in., 1½ in. and 2 in. circumference.

These cords are of superior quality and are guaranteed against all inherent defects found in cheaper cords. "Emu" Brand Plaited Cotton Venetian and Verandah Blind Cords are available in hanks and reels similar to sash cords.

### Scaffolding Ropes

These ropes are for use in the building trade and are made up in any lengths as required (usually 17 feet), and are whipped at each end ready for use. They can be supplied in two qualities of manila; the best quality is recommended for economy and long service.



A Hank of "Emu" Brand Sash Cord.



## DATA ON SASH CORD

## Sash Cord Sizes

The number of a cord is equal to the diameter in 32nds of an inch; for instance, No. 9 cord measures  $\frac{9}{32}$  in. in diameter. To ensure the correct and even wearing of sash cords it is recommended that the weight for each cord and the diameter of the pulley used should be as set out in the following schedule:—

Weights per Cord.	Minimum Pulley Diameter.	Cord Size of	Diameter of Cord.	Circumference of Cord.	Approx. No. of feet per lb.
Up to 5 lbs.	1½"	5	$\frac{5}{32}$ "	$\frac{1}{2}$ "	100
Up to 6 lbs.	1½"	6	$\frac{3}{16}$ "	$\frac{5}{8}$ "	70
6 to 12 lbs.	1¾"	7	$\frac{7}{32}$ "	1"	54
12 to 20 lbs.	2"	8	$\frac{1}{4}$ "	$\frac{3}{4}$ "	46
20 to 30 lbs.	2¼"	9	$\frac{9}{32}$ "	$\frac{7}{8}$ "	38
30 to 40 lbs.	2½"	10	$\frac{5}{16}$ "	1"	30
40 to 45 lbs.	3"	11	$\frac{11}{32}$ "	1½"	25
45 to 50 lbs.	3"	12	$\frac{3}{8}$ "	1¾"	20

## Weights of Sashes and Glass

To determine the approximate weight of glazed sashes, use the following figures:—

## Glass—

- 21 oz. glass—1.3 lbs. per sq. foot.
- 26 oz. glass—1.6 lbs. per sq. foot.
- Obscure glass—averages 1.8 lbs. per sq. foot.
- ¼ in. plate glass—3.6 lbs. per sq. foot.

## Sash Frame—

Using red pine and averaging 2½ in. width of material, add the height and width of each sash and multiply by—

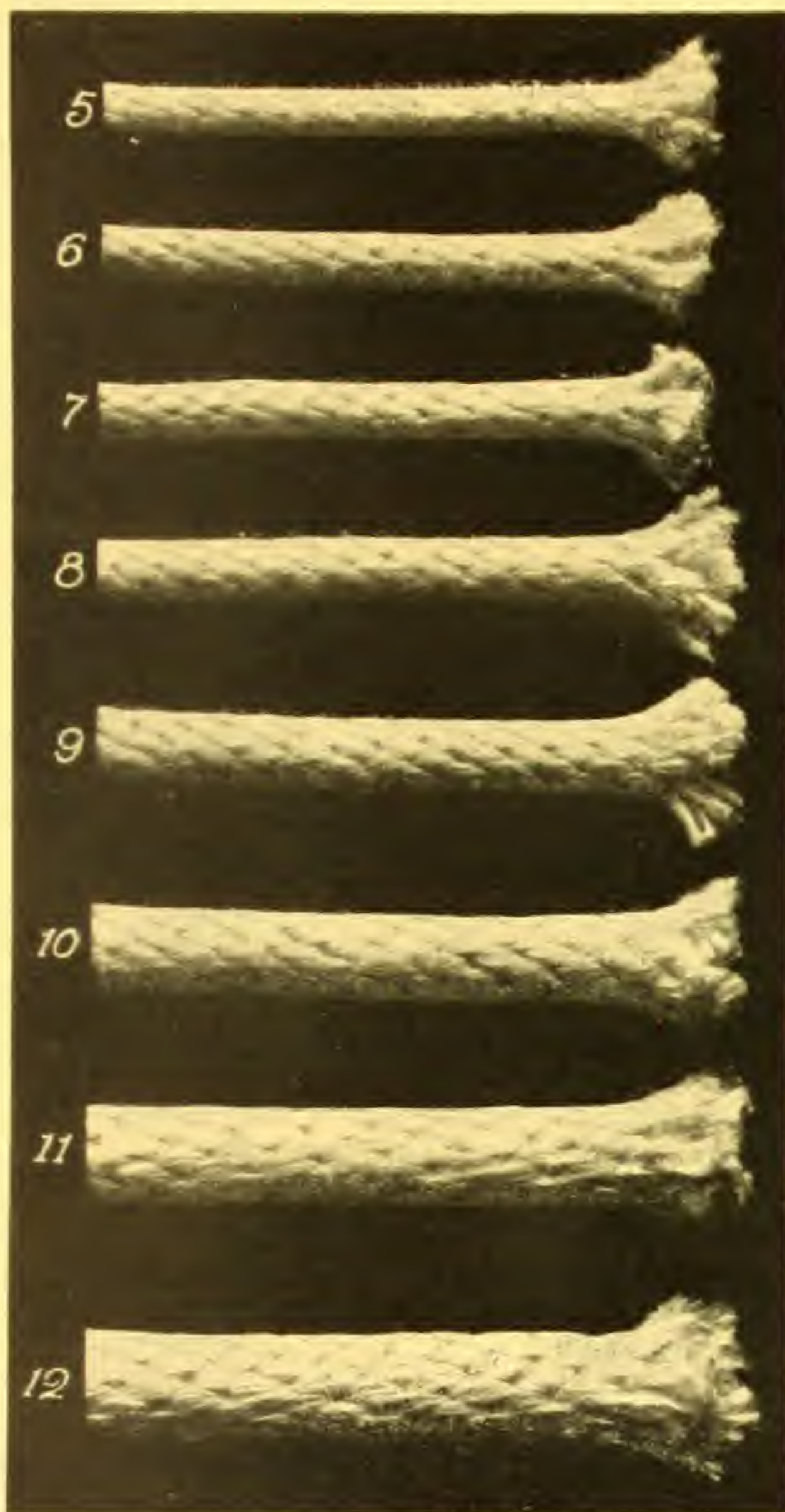
- 1.6 for 1½ in. sash
- 1.8 for 1¾ in. sash
- 2.1 for 2 in. sash

The answer is in lbs.

As these figures are approximate, it is recommended that the actual glazed sash should be weighed.

## ARCHITECT'S SPECIFICATION

**SASH CORD.**—All double-hung sashes shall be hung with "EMU" Brand Braided Cotton Cord, to be in conformity with the Cord Manufacturers' recommendations for size of cord pulley and weight of sashes.



Actual full-size illustration of "Emu" Brand Cotton (Braided) Sash Cord.

## DATA ON SASH PULLEYS AND WEIGHTS

(Prepared by the Architectural Staff of Ramsay's Catalogue from Authentic Sources)

## SASH PULLEYS

1. Cottage Work—Pressed steel axle pulleys.
2. General Use—All iron secret axle pulleys (cast in two pieces). Sizes:—1½ in., 2 in., 2½ in., and 3 in. diameter.
3. For Better Class Work—As above, with (a) Brass face and iron wheel; or (b) Brass face and brass wheel; in sizes as before.
4. For Heavy Sashes, and easy running—Ball-bearing, brass face and brass wheel; in sizes as before.

## SASH WEIGHTS

1. Cast Iron (in stock sizes)—Are made with a tapered eye-hole in the end for fastening the cord. Weights range from 1½ lbs. to 25 lbs.  
1½ lbs. to 4½ lbs. are 1½ in. in diameter.  
5 lbs. to 9½ lbs. are 1¾ in. in diameter.  
10 lbs. to 14 lbs. are 2 in. in diameter.

14½ lbs. to 19½ lbs. are 2 in. in diameter.  
20 lbs. and over are 2½ in. in diameter.

2. Cast Iron (for special jobs)—Where headroom is limited the weights can be made of a section to utilise the pocket space to full advantage. They range from 1 in. square, perhaps, 1 in. x 1½ in., 1½ in. x 1½ in., 1½ in. x 2 in., 2 in. x 1½ in., up to 2½ in. square.
3. Lead—Where headroom is still more limited, or with a heavy sash; weights are of lead, which require a length two-thirds that of iron.

Where two or more sashes are close together and the weights would foul each other, a pulley may be fixed in the end of the weight, and two pulley weights are thus used. Instead of four single weights, the cord coming down from one sash, under the pulley and up to the second sash. This pulley weight, being twice as heavy as the single weight, has only half the travel. Such weights are made of lead or iron to the required section, round or square.



<div>27a</div> <div>S.A.A. File No.</div>	<div> <h1>WORMALD BROS. LIMITED</h1> </div> <div> <p>FIRE PROTECTION ENGINEERS SINCE 1889</p> </div> <div> <p>CITY OFFICE: 19 BLIGH ST., SYDNEY. FACTORY: YOUNG ST., WATERLOO, SYDNEY</p> </div> <div> <p>BRANCHES: MELBOURNE—180 Bay St., Port Melbourne. BRISBANE—"City Buildings," Edwards St. NEW ZEALAND—"T. &amp; G." Buildings, Wellington. ADELAIDE—Bowden, PERTH—Wellington St.</p> </div>	
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[For Other Products, See Pages 148, 158, 264 and 308]

## "BANGOR" BALL BEARING DOOR HANGERS

### The "Bangor" Hanger

"Bangor" Hangers are made entirely in Australia and can be confidently specified for any job, as stocks can always be had. There is a type of hanger to suit any sliding door and the standard track suits all types, with the exception of parlour or house doors sliding into a cavity. A special paragraph describes this type in detail.

Most hardware stores stock "Bangor" now, so that your contractor will have no difficulty in completing his job. The inverted track is of great benefit where dust and grease might accumulate, and it also gives protection to fittings in the open air, such as on store doors, etc.



The "Bangor" Carriage and Door Plate.

### House Door Hangers

Parlour or House Door Hangers are made specially for doors to slide into cavity walls and can be relied upon to give unfailing service. They have a vertical adjustment of 2½ inches and are easily fixed into position.

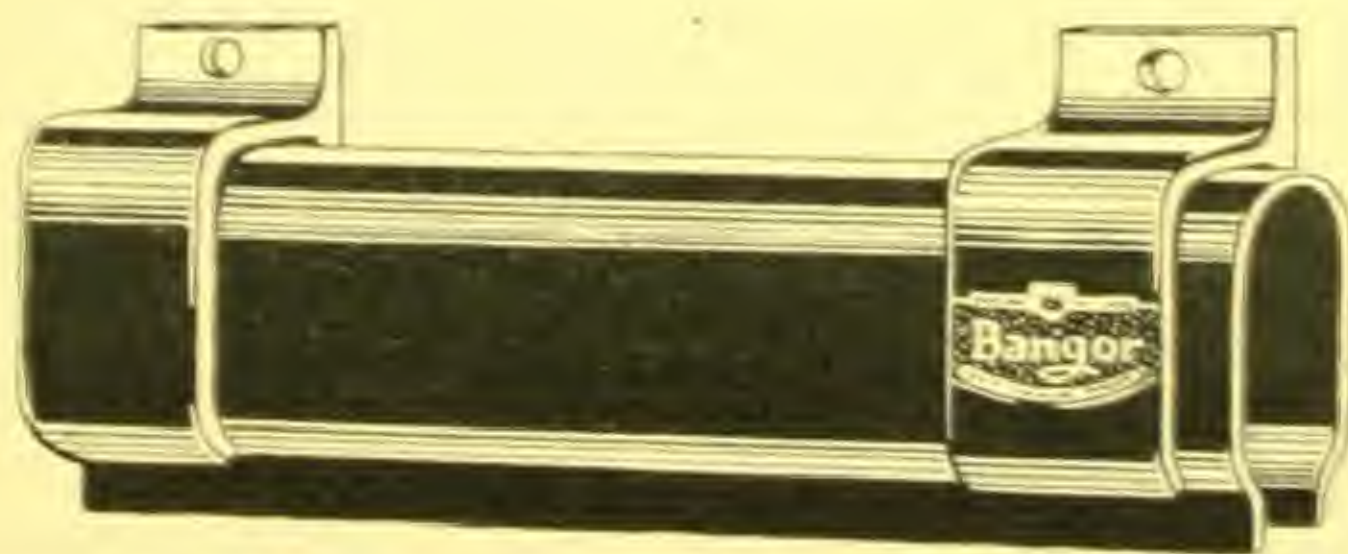
A special slotted "header-plate" is provided for holding the track inside the cavity and, for this type, special counter-punched track is used.

The track is supplied in one length for openings up to four feet and in two lengths for larger openings.

The diagram below gives the amount of room required and shows the method of fixing.

### "Bangor" Track and Brackets

"Bangor" Track is stamped out of 12-gauge steel in lengths up to 10 feet. The Brackets are malleable cast iron, capable of carrying a great weight. The standard track will carry up to 800 lbs. weight, though with extra bracketing the track has been tested safely up to 2,500 lbs. weight.



Piece of "Bangor" Track with End and Centre Brackets.

### Adjustment

Adjustment is given in each type of hanger, so that perfect ease is found in levelling off doors. This is done by means of a lock-out which operates on the pendant bolt of the carriage.

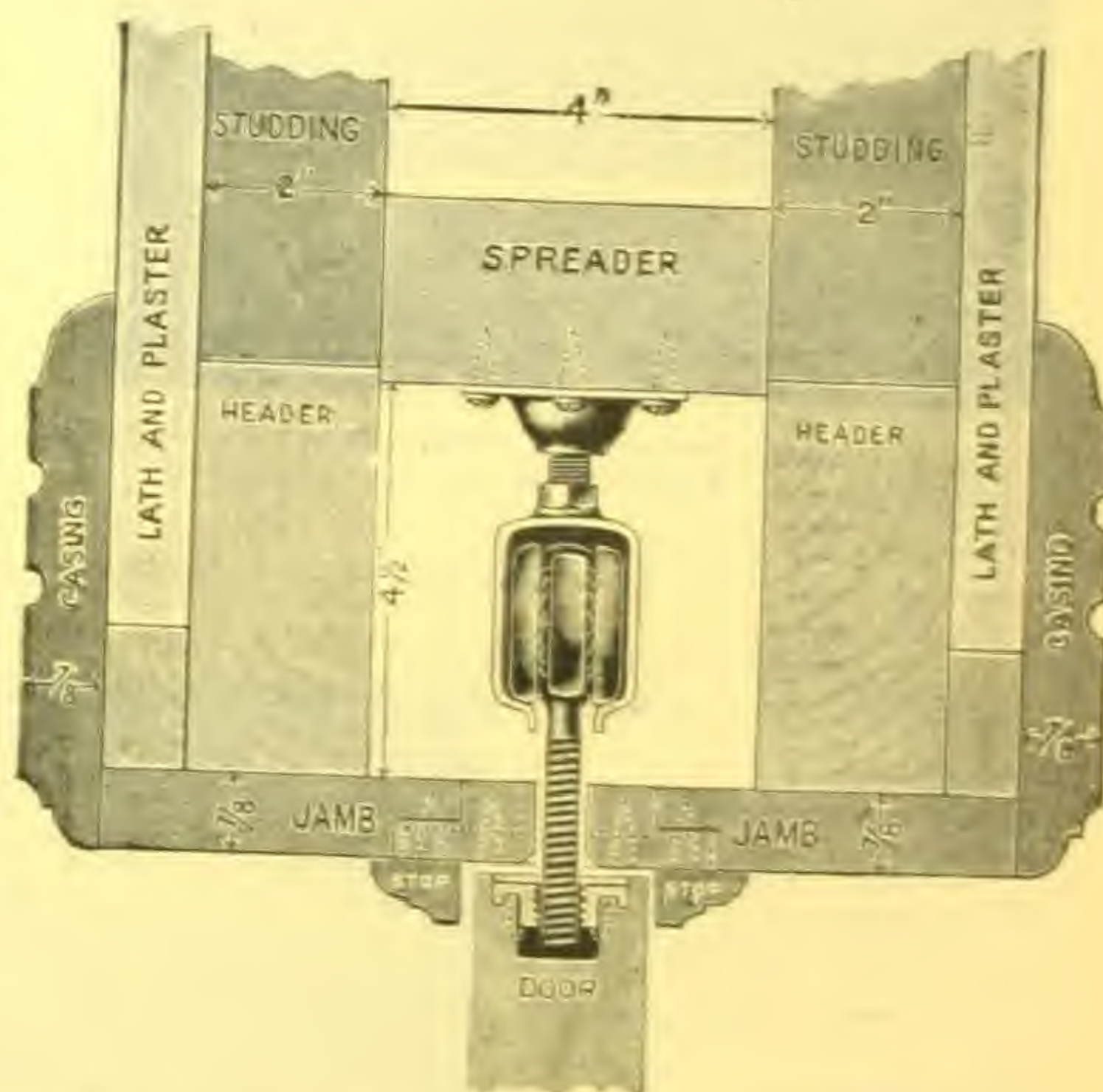
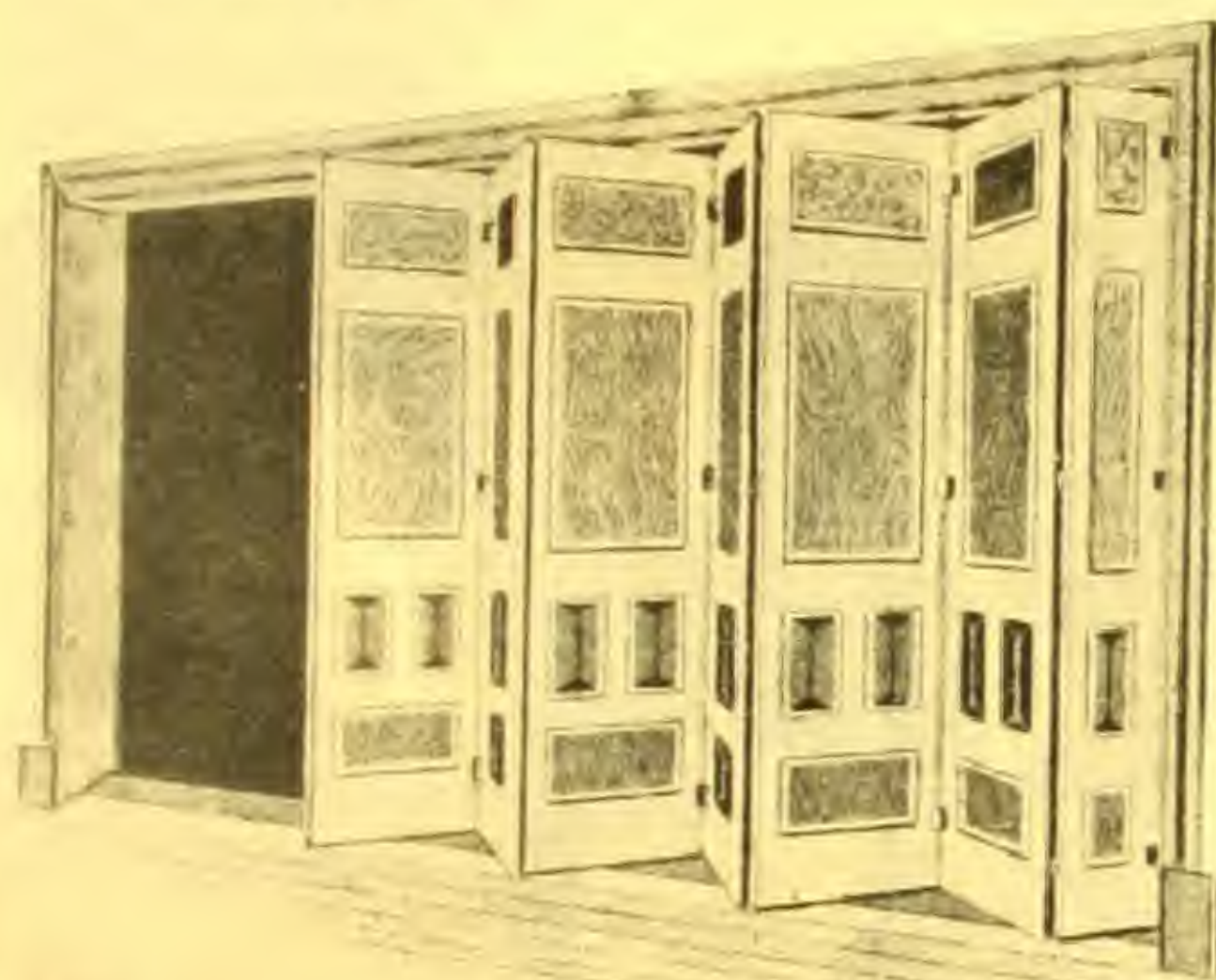


Diagram Showing Space Required for Fixing "Bangor" Parlour Door Hangers.



### Hangers for Accordeon Doors

Accordeon Doors are an ideal means of dividing off large rooms such as schools or halls, and are very easily operated when on "Bangor" Track and Hangers. Each door should not exceed three feet in width and should not weigh more than 90 lbs. Furthermore, they should be at least  $1\frac{1}{2}$  inches thick so that secure fastening can be obtained. A special ball-bearing pendant bolt carriage is used for accordeon doors so that no binding occurs when they swivel. The carriages must be fastened to the exact centre on top of door and are used on the outside and then every alternate door. The half-door must be hinged to the jamb at the side of the opening.



Accordeon Doors on "Bangor" Hangers.

### Store or Barn Door Hangers

Store or Barn Door Hangers are used with the ordinary side brackets, as illustrated with the piece of track on the previous page. They are made for doors to slide on the outside of an opening and carry the doors on triangular iron "aprons" screwed on to the outside of door at the top. Two of these hangers are needed for each door. There are two sizes of "Bangor" Barn Door Hangers—No. 4 is for doors from  $1\frac{1}{2}$ –2 $\frac{1}{4}$  inches thick and weighing up to 300 lbs., while No. 5 will take doors weighing from 300–500 lbs., and measuring  $2\frac{1}{2}$  to 3 inches thick. Both vertical and horizontal adjustments are given with this type of hanger, so the door can be set out the required distance from the wall.

### Elevator Door Hangers

For elevator doors, the plain standard track is used with side brackets, but they are fastened with flat door-plates, as used on parlour doors. The usual size of elevator doors is from 2 ft. 6 in. to 3 ft. wide. Track should be just twice the length of the opening and needs two end brackets and one centre bracket. Rubber Tipped Door Stops are also provided, and Floor Channels, if required.



Length of "Bangor" Track and Hangers for Elevator Doors.

### Garage Door Sets

Garage Door Sets can be used for single door, leaved or hinged sections. They are made to slide on a curved track to the side of the garage and so leave the doorway quite clear. For these curved tracks a special single-wheel carriage has been made, which operates on a ball-bearing swivel door-plate. Two special castings are made for the curve in the track. One has a 4-inch radius and the other a 12-inch radius. Wherever room permits, this latter should be used.

When showing plan, give distance from door-jamb to wall and show whether single, leaved or hinged door. A floor channel can be supplied extra, and is recommended, though not necessary.

### ARCHITECT'S SPECIFICATION

Specify "Bangor" Track and Hangers complete of.....type, for opening..... In the case of doors in more than one section, state full particulars as to whether sliding from both sides, number of sections, etc.



"Bangor" Curved Track for Garages.



27b

S.A.A. File No.

## WM. BEDFORD LIMITED

476-490 LITTLE LONSDALE STREET  
MELBOURNEAustralasian Agents for:  
LIPS' SAFE AND LOCK WORKS LTD.,  
LONDON AND HOLLAND

LIPS

[For Other Products, See Pages 137, 164, 328, 415]

## LOCK DEPARTMENT

Mortise Cylinder and Lever Locks, for use with  
Lever and Knob Furniture; Padlocks, Garage Locks,  
Rim Locks, Sliding Door Locks, Espagnolette Bolts.B 309/1230  
3½ x 5½ x 1½ in.  
Cylinder Rim Lock.B 305/905. Extra Heavy  
Cylinder Mortise Lock.  
11½ x 6½ x 2 in. Plate  
Size, 17½ x 3½ in. Specially  
designed for Main Doors  
of Banks and other large  
Buildings.B 306/906  
Used in conjunction with  
B 305/905. Giving a secur-  
ity which can not be  
obtained by any other  
locking process.B 298/803  
6½ x 4 x 2 in.  
Mortise Front Door Lock.  
The Ideal Front or Shop  
Door Lock.B 321/913  
3-in. Cylinder Padlock.  
Solid Gunmetal Lock  
Case, with Nickelled  
Shackle, Specially con-  
structed for cases  
where an extensive  
system of master-  
keyed padlocks is  
required.B 308/1092  
Combined Locking Bar and Five-Lever  
Lock for Garage and Warehouse Doors.B 303/910  
Mortise Sliding Door  
Lock, 5½ x 3½ x 3 in.  
For Internal and Ex-  
ternal Sliding Doors.Locking Bar 1092 is approved by the Accident Underwriters'  
Association of Victoria.  
The Fire Brigade met with unexpected trouble, at a recent  
Melbourne fire, in having to hack through a door equipped with  
a 1092 Locking Bar.



## SOLID BRASS OR BRONZE DOOR FURNITURE

Australian-made Mortise and Rim Locks, Dead Locks, Rebated Mortise and Rim Locks, Lift Locks, etc.; Lock Furniture, Knobs and Lever Handles in brass and bronze.

Wm. Bedford Limited manufacture a large variety of Locks, and all types are guaranteed indefinitely against defective workmanship or material.

They have a most comprehensive range of Lock Furniture (Plates, Handles and Knobs), and the craftsmanship on their Special Furniture is excellent.

They make a feature of producing architects' designs of Door Furniture, etc.

They will gladly supply you, upon your application, with a copy of their comprehensive Catalogue, in which is devoted a large section to the large number of Locks and new designs for Door Furniture.



B 201.

7½ x 2½ in.



B 199.

8 x 2½ in.

B 264.

Mortise  
Room Door  
Latch Bolt  
Reversible.  
Depth of Mortise, 2½ in.  
Height of Mortise, 2½ in.

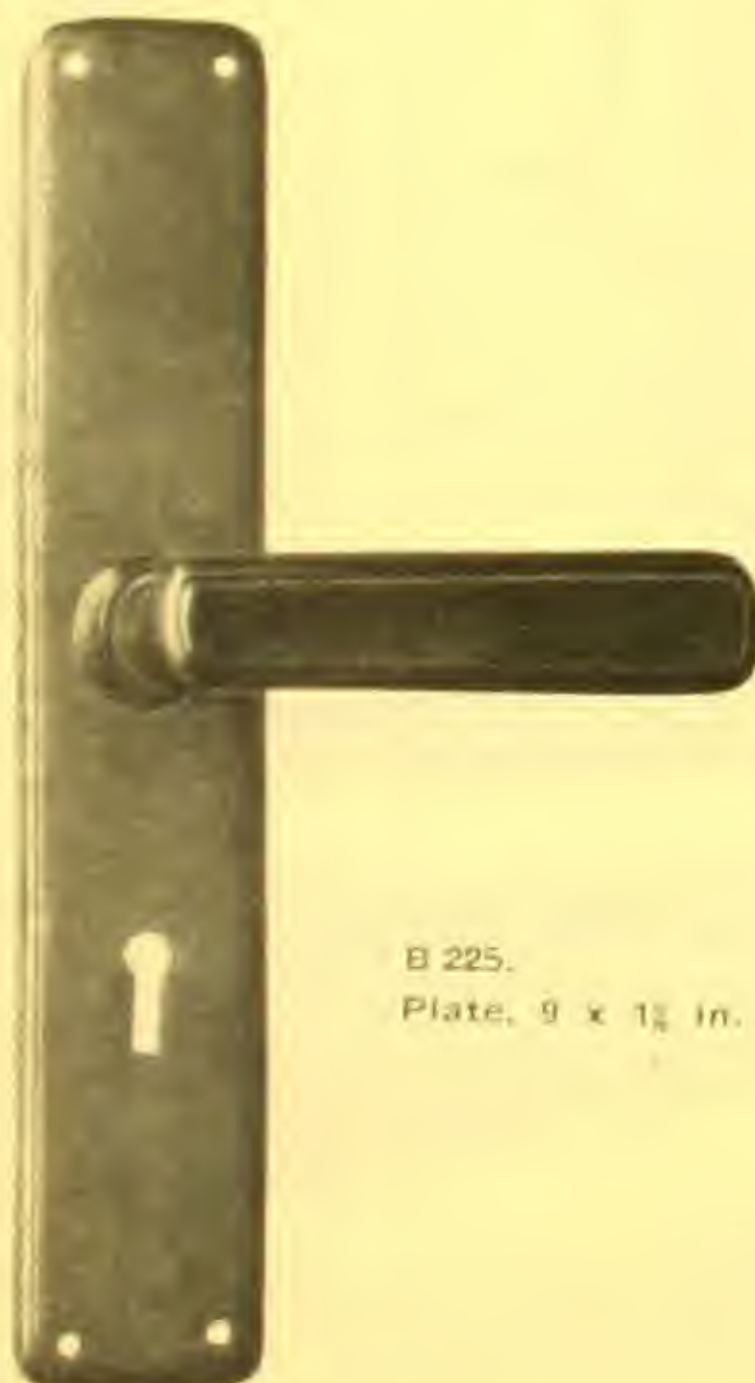


B 262.

Four-Lever  
Mortise Room  
Door Lock,  
For Lever  
Handles Only.  
Depth of Mortise, 3 in.  
Height of Mortise, 4½ in.



B 198. 11 x 2½ in.



B 225.

Plate, 9 x 1½ in.



B 259.

Two-Lever  
Mortise  
Room Door Lock.  
Suitable for all  
Lock-Set Furniture.

3½ x 3½ in.



B 195a.

Cast Brass  
Mortise Lock-Set.  
Knob Size, 1½ in.  
Plate Size, 6½ in.  
x 2½ in.

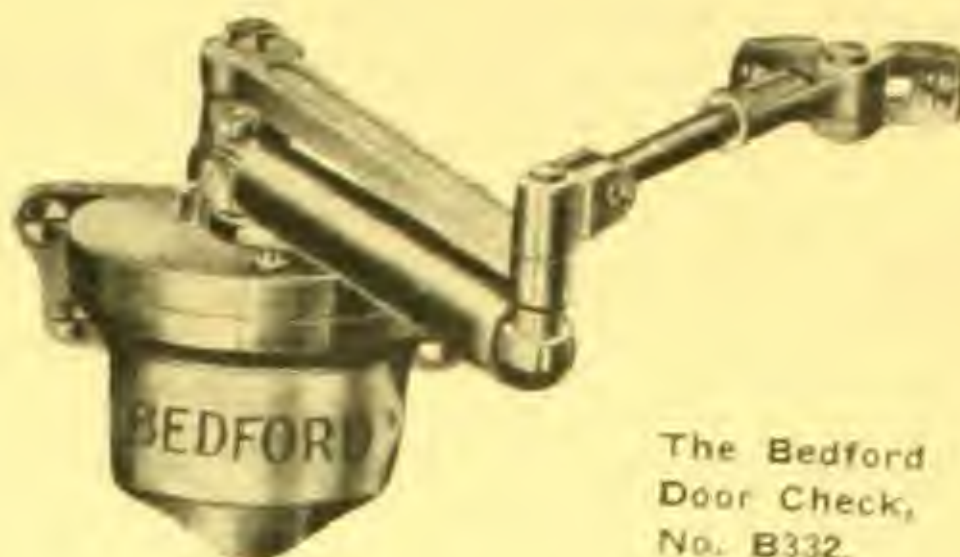
(Continued on next page)



## AUSTRALIAN-MADE DOOR CHECKS

## Manufacture

The Bedford Door Checks are made from selected materials and will stand up to the strain of continuous use under most difficult conditions.



The Bedford  
Door Check,  
No. B332.

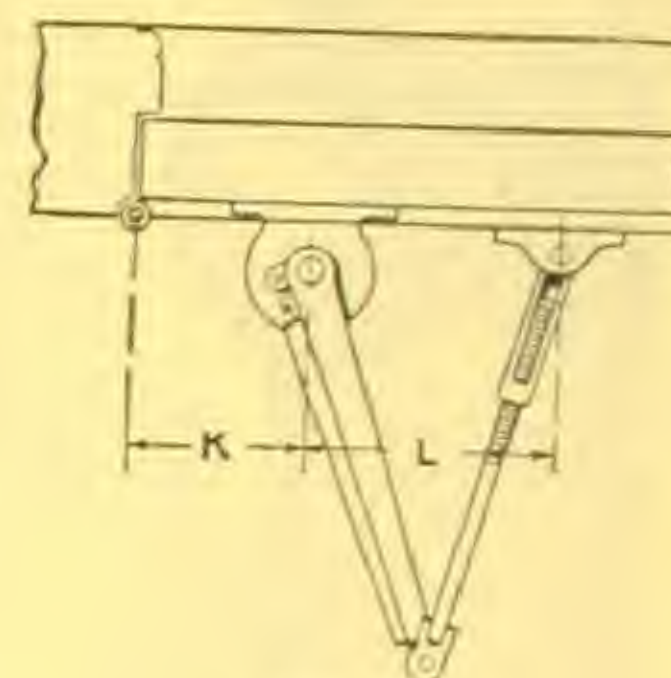


Fig. 2.

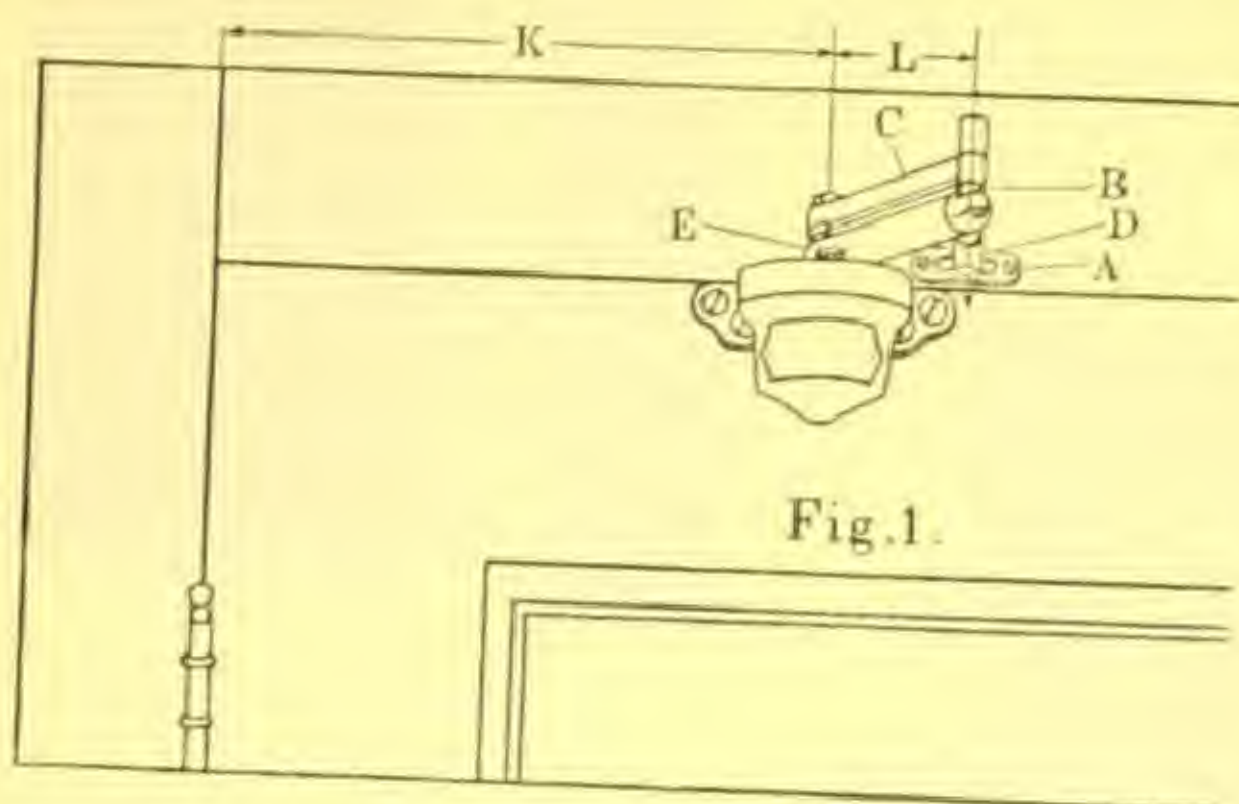


Fig. 1.

TABLE OF DISTANCES

Size	K	L
Check No. 2	5 1/4 in.	2 in.
Check No. 3	6 1/4 in.	2 1/2 in.
Check No. 4	7 1/4 in.	2 1/2 in.
Check No. 5	8 1/4 in.	2 1/2 in.

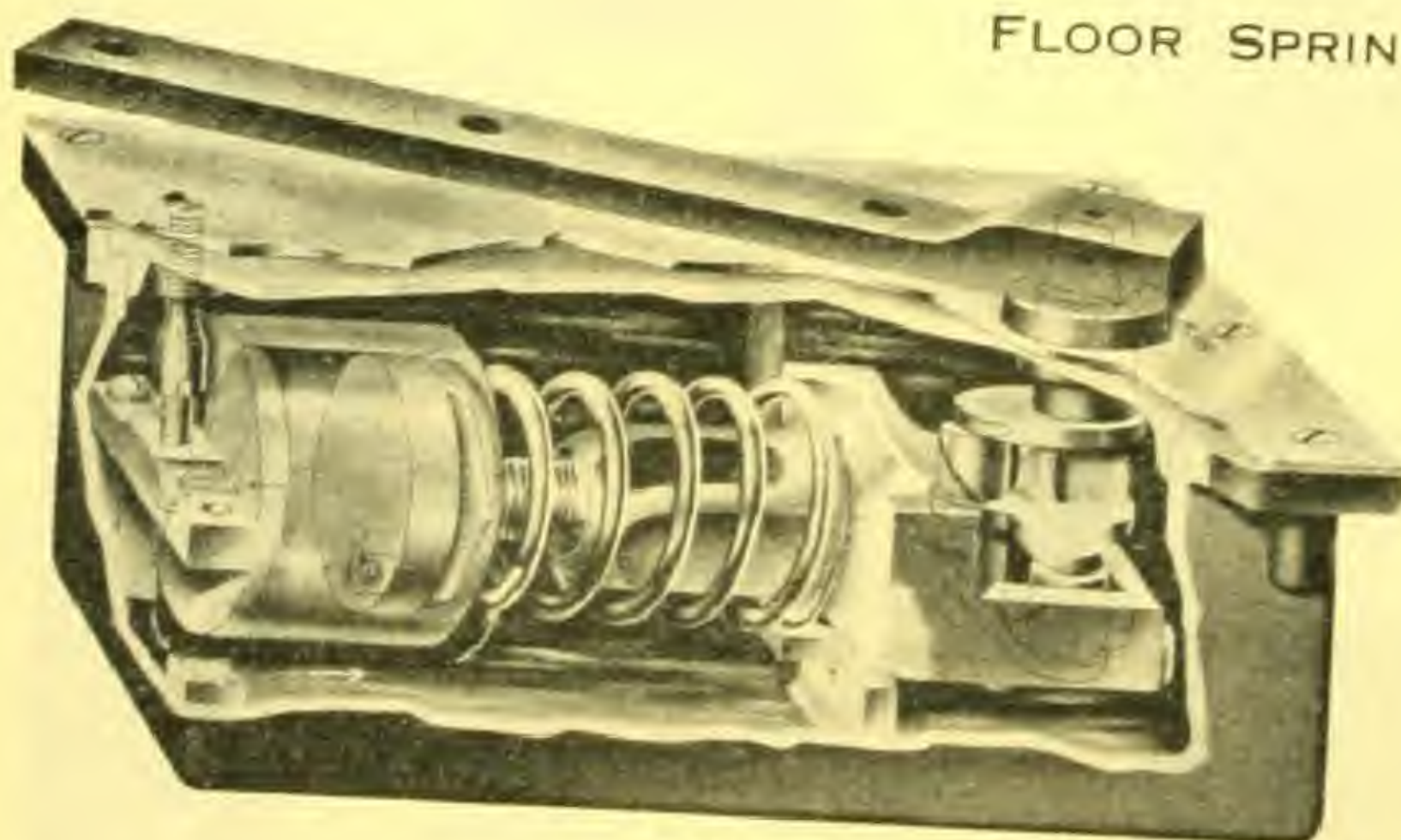
## Fixing

When fixing the Door Check mark off the distances "K" and "L" in the tables below, which vary according to the size, number, cast on the bottom of each Check. Take care that the door style, on which the check must be fixed, is flat. Mark off position of screw holes, first seeing that the spring arm, "C," clears the door frame. If the door frame projects beyond the door and will not allow the check to clear it, place a block of wood of sufficient thickness between the check and the door. Fix the door check firmly and be sure that it is square on the door; attach the main arm hinge "A" (see fig. 1) to the door frame, in accordance with the distances "L" in the table below.

## DUTIES OF BEDFORD No. 332 DOOR CHECK

Light Inner Doors	Size No. 2
Normal Inner Doors and Light Glass Doors	Size No. 3
Normal Outer Doors and Glass Shop Doors	Size No. 4
Heavy Outer Doors	Size No. 5

## FLOOR SPRINGS



B 330.

The distance from the centre of Pivot to rear edge of Floor Spring is only 2 in.

## SIZES

Made in Two Sizes.

330/1—For Light Doors

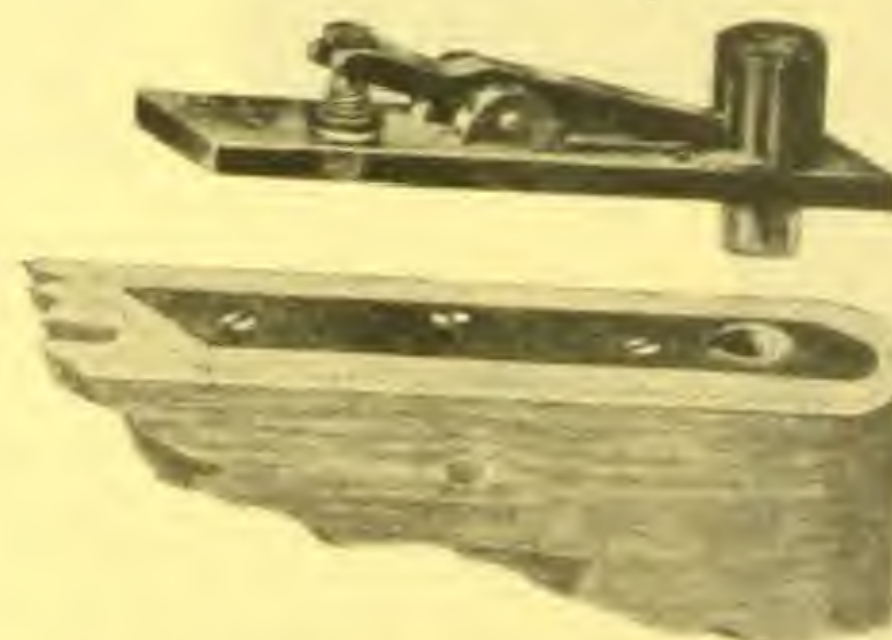
330/2—For Heavy Doors

## Size.

9 1/2 x 5 1/2 x 3 in.

11 1/2 x 6 1/2 x 3 in.

Bedford's Oil Check Floor Spring has a powerful compression spring, which operates centrally upon the pivot, so that pressure to the right or left is the same. Should the door be opened to slightly more than 90 degrees, it will remain open. A slight pressure is then sufficient to again bring the door back to its closed position. Bedford's springs are manufactured to fit into any class of floor.



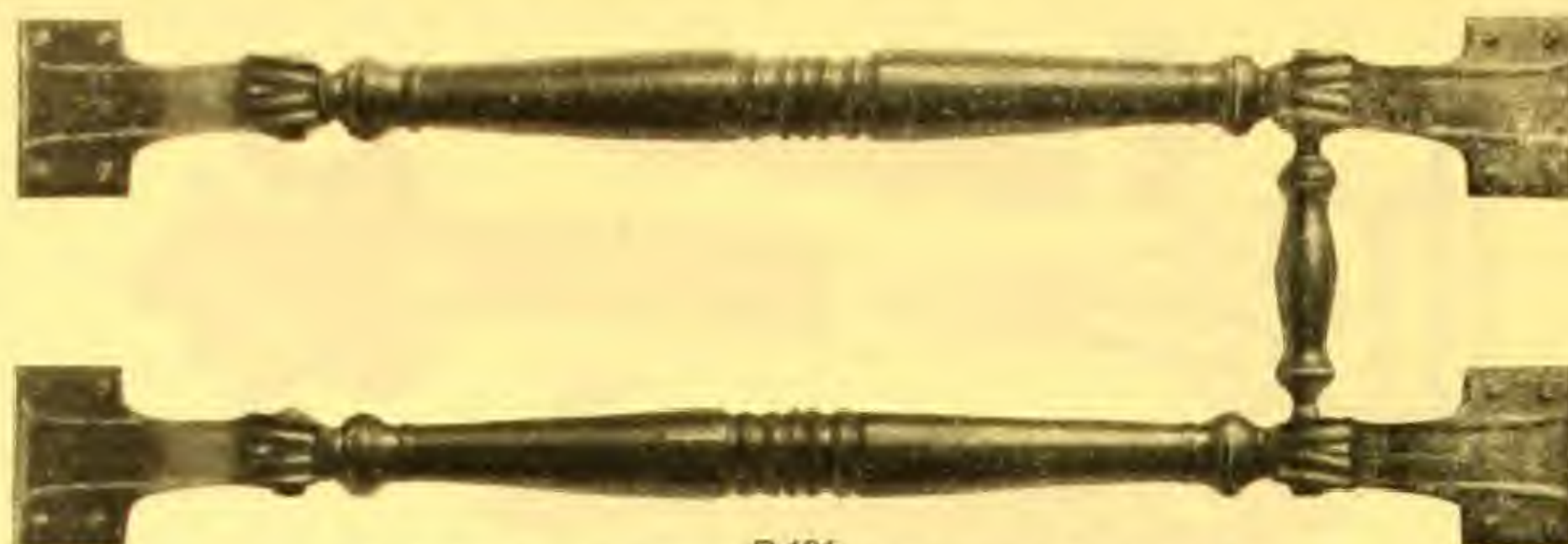
With each Floor Spring an Upper Pivot, as illustrated, is supplied. This ensures easy fixing and obviates the necessity for hinges.

(Continued on next page)



AUSTRALIAN MADE BEDFORD DOOR FITTINGS

CAST  
BRONZE  
PULL AND  
GUARD  
HANDLES.



B 191.

An example of fine workmanship in Pull Handles.

ALL TYPES  
OF DOOR  
FITTINGS  
IN STOCK.



B 81.

BRASS  
PANIC  
BOLT.

When ordering,  
state height  
of door.



B 106.

Made specially for heavy Fanlights.

BRASS  
CONVERTIBLE  
FANLIGHT  
OPENER.



B 160.

Plate 15½ x 3 in.

CAST BRASS  
OR BRONZE  
DOOR PULLS.



B 166.

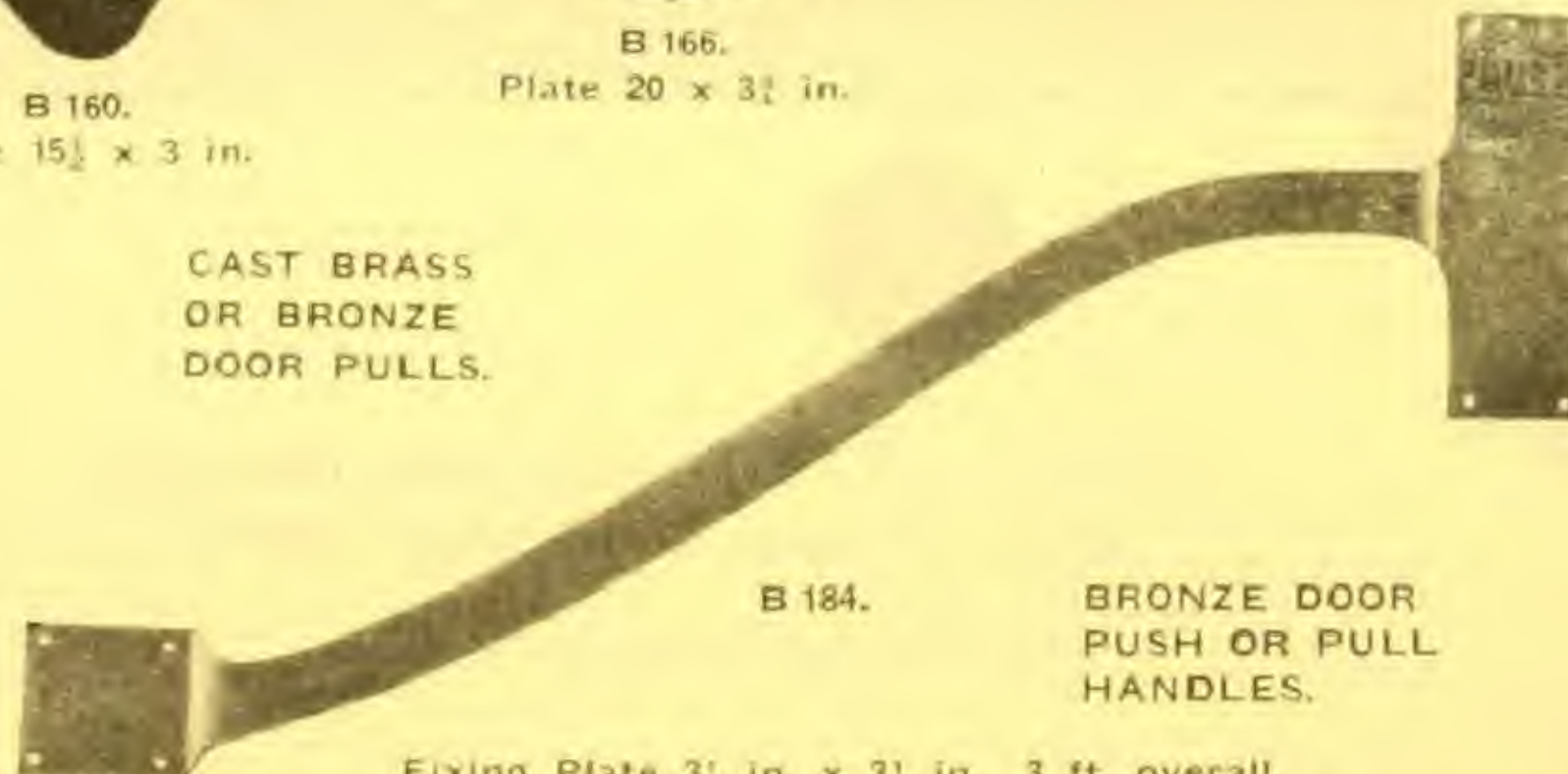
Plate 20 x 3½ in.



SPECIAL  
AUTOMATIC EXIT  
FIXTURES;  
BRASS OR BRONZE.



B 84.



B 184.

BRONZE DOOR  
PUSH OR PULL  
HANDLES.

Fixing Plate 3½ in. x 3½ in. 3 ft. overall.  
Fixing Plate, 9 in. x 3 in.



## MOCK GATE, DOOR AND BOX HINGES

No. 1.  
11 x 7 in.

No. 2.  
8 x 2½ in.

No. 3.  
10 x 7 in.

No. 4.  
3 x 2 in.

No. 5.  
14 x 4½ in.

No. 6.  
17 x 7½ in.

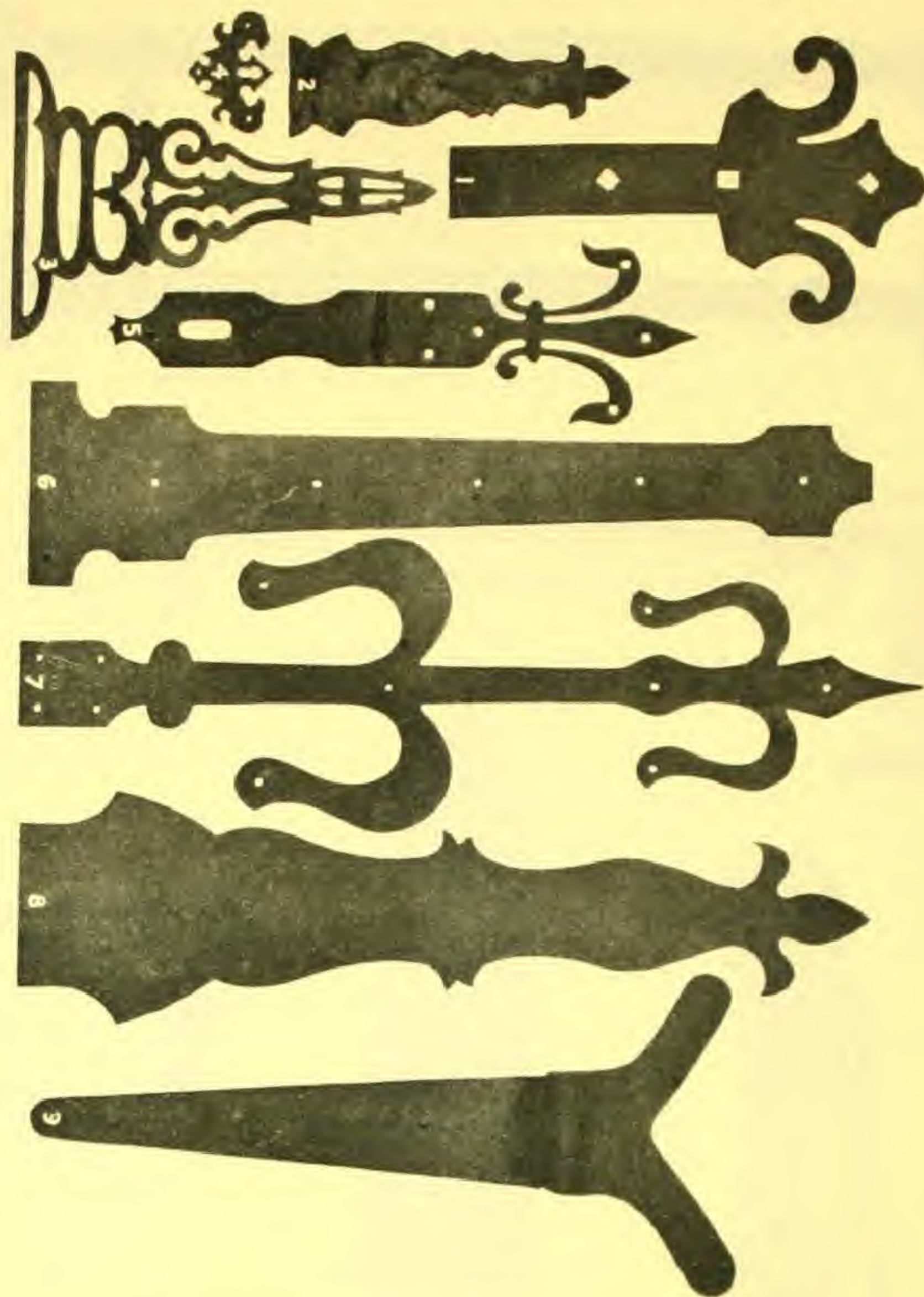
No. 7.  
20 x 5½ in.

No. 8.  
21½ x 7½ in.

No. 9.  
20 x 5 in.



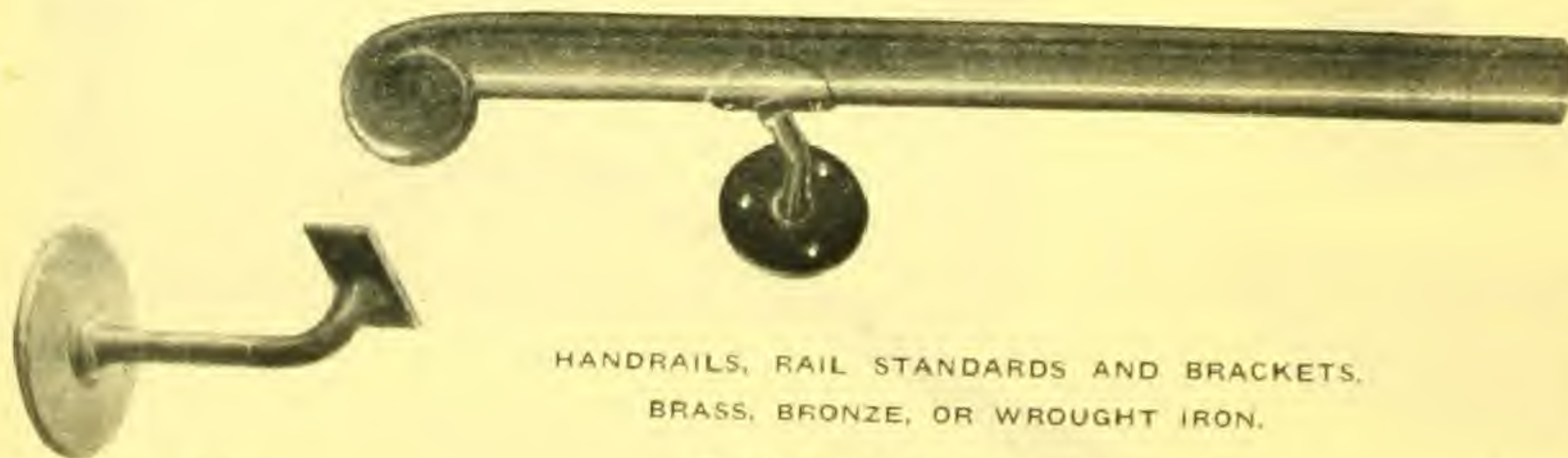
B 343.  
Foot Rail Standard.  
For any size rail.



MANUFACTURED IN BRASS, BRONZE, OR  
RUSTLESS STEEL.



B 345.  
Rail Support.



B 348.  
Stair Hand Rail Bracket  
For Wooden Rail.

HANDRAILS, RAIL STANDARDS AND BRACKETS.  
BRASS, BRONZE, OR WROUGHT IRON.

For Complete Lists, See Catalogue.



B 351.  
Stair Hand Rail  
Bracket.





# D. & W. CHANDLER LTD.

## The Biggest Hardware House in Victoria

234-236 FLINDERS LANE, MELBOURNE.

F 4175 (4 Lines)

276-294 BRUNSWICK STREET, FITZROY.

J 4145 (7 Lines)

And At

Armstrong Street, BALLARAT.  
Lava Street, WARRNAMBOOL.Hargreaves Street, BENDIGO.  
Pynsent Street, HORSHAM.

27

S.A.A. File No.

[For Other Products, See Pages 36, 76, 120, 175 and 492]

### HARDWARE—ARCHITECT'S SELECTION GUIDE

D. & W. Chandler Ltd., "The Biggest Hardware House in Victoria," have a most comprehensive range of Builders' Hardware and Fittings for the home, factory, office, bank, mercantile apartment and hotel building.

The products are displayed in well-arranged show-rooms in Melbourne and the principal cities of the

State. Architects and their clients are invited to inspect these stocks when selecting Hardware for their building project, thus helping in definitely deciding on the fittings to be used so that the specification may be completed and accurate costs arrived at.

### ARCHITECT'S CHECKING LIST FOR SELECTION OF EQUIPMENT

Location.	Equipment	Preliminary Work
KITCHEN	<b>STOVES</b>	
	Gas	Gas Supply (plumber)
	Electric	Separate Power Circuit (electrician)
	Fuel	Set by bricklayer
	Gas Stove Hood	Fixed by plumber
	<b>SINKS</b>	
	Porcelain Enamelled	Frames by carpenter
	Fire Clay	Fixed by plumber
	Metal	Cold water supply, wastes and flashing (plumber)
	Combined Sink and Drainer	Hot Water Supply (hot water engineers)
	Draining Rack	Connections by plumber
	Water Filter	
	<b>WATER HEATERS</b>	
	Wee Douglas Gas Heater	Fixing and connections by plumber
	Briquette Boilers	
	<b>FOOD PRESERVATIVE CABINETS</b>	
	Cooling Cabinet	Fixed by carpenter
	Ice Chests	Drip waste by plumber
	Refrigerator	Power outlet by electrician
	<b>FURNITURE, Etc.</b>	
	Kitchen Cabinets	Supplied by "Chandlers"
	Ironing Board	Built in by carpenter
		Power outlet by electrician
	Dish Washers	Waste by plumber
	Tiles	Hot water supply by hot water engineers
	Oxidised and Nickel-plated Builders' Furniture:	
	Draw-pulls	Fixed by joiner
	Door Knobs	
	Flush Handles	
	Track for Sliding Doors	
	Roller Bearings	
	Fly-wire Windows and Doors	Hung by carpenter
	Electric Iron	Power point by electrician
BATHROOM	Baths, white and coloured	
	Flanged baths, white and coloured	Waste and cold water supply by plumber
	Basins, pedestal and plain, white and coloured	Hot water supply by hot water engineer
	Shower Fittings	Connection by plumber
	Electric Bath Heater	Power outlet by electrician
	Gas Bath-heater	Gas Supply by plumber
	Chip Bath-heater	Water connections by plumber
	Shower Screens	Supplied by "Chandlers"
	Towel Rails, nickel-plated	
	Tiles, white and coloured	Laying (tiler)
	Soap Recesses	
	Nickel-plated or Oxidised door furniture	Fixed by joiner

Location.	Equipment.	Preliminary Work
	Pedestal Pans	Connections by plumber
	Closet Seats	



The above diagrams show the eight different patterns in which Flanged Baths can be supplied.

HALL	Indirect Shades, with or without chains	Installed by electrician
	Wall-paper	Paperhanger
LIVING ROOM, DINING ROOM, BEDROOM	Floor Coverings	Laid by "Chandlers"
	Edgings	Laying (tiler)
LAUNDRY	Tiles	
	Grates	
	Briquette Stoves and Grates	Set by bricklayer
	Hearths	
	Radiators	Power outlet by electrician
	Electric Fires	Installed by electrician
	Electric Light Fittings	Built in by "Chandlers"
	Outside Window Awning	Hung by "Chandlers"
	Roller Blinds	Fixed by carpenter
	Builders' Furniture	
LAUNDRY	Mantelpiece	
	Troughs	Installed by plumber.
	Iron-frame Coppers, (gas or fuel)	Frame by carpenter
	Cement-frame Coppers (gas or fuel)	Water supply, gas & waste connections by plumber
	Rotary Clothes Lines and Hoists	Built in by bricklayer
	Clothes Washers, electric & vacuum	Installed by "Chandlers"
		Hot water supply by hot water engineer, waste by plumber, power outlet by electrician



# RICHARDS-WILCOX MANUFACTURING Co.

AURORA, ILLINOIS, U.S.A.

27a

S.A.A. File No.

Australasian Agents:

MOLDEN, WEBER &amp; CO. LTD.

P.O. Box 1349J, SYDNEY, N.S.W.

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WELLINGTON

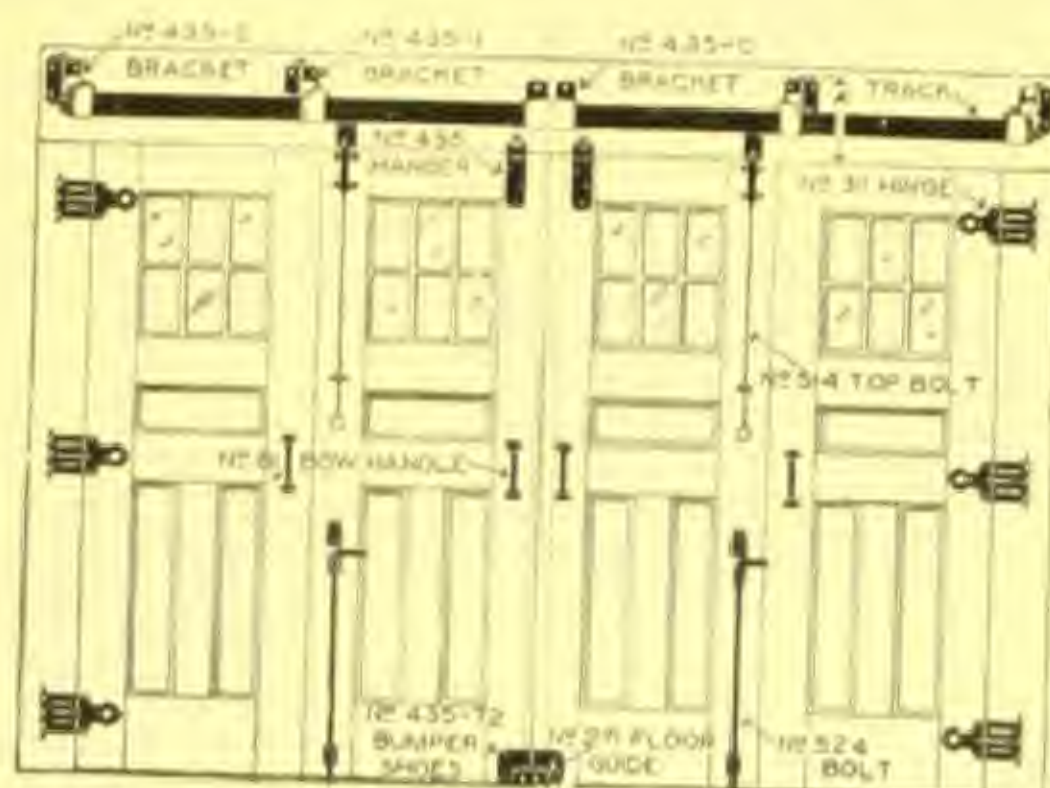


## R-W EQUIPMENT FOR EVERY GARAGE DOORWAY

### R-W "SLIDETITE" EQUIPMENT

"Slidetite" equipment consists of complete sets of hardware for the operation of from 2 to 10 doors closing in the one opening. The doors are so hinged together and suspended at intervals on hangers running in overhead tracks that the doors open or close with a sliding-folding, accordion movement, and at all times occupy a minimum of space. Up to 30 ft. in width no intermediate posts or mullions are required.

When open, the doors are carried to one or both sides of the opening compactly folded together and swung clear of the jamb line opening, standing either at an angle to the front wall or, where space permits, folded parallel with the front wall.



Doors equipped with typical "Slidetite" hardware. The expense of a separate entrance door is eliminated.



Doors equipped with "Slidetite" are easy to operate—a child can open and close them.

### Features

The outstanding feature of "Slidetite" is that its method of operation causes the doors to close absolutely tight together and against the rebate at the head jamb and sill.

They are extremely easy to operate. R.W. hardware being adjustable, prevents the doors from any sagging that may put them out of alignment.

### Hardware Furnished

Each "Slidetite" set consists of the requisite quantity of track, hangers and door locking devices, together with all bolts and screw attachments necessary to operate the number of doors for which the set is intended. Complete erection instructions are provided with each set of equipment.

### R-W "SLIDASIDE" EQUIPMENT

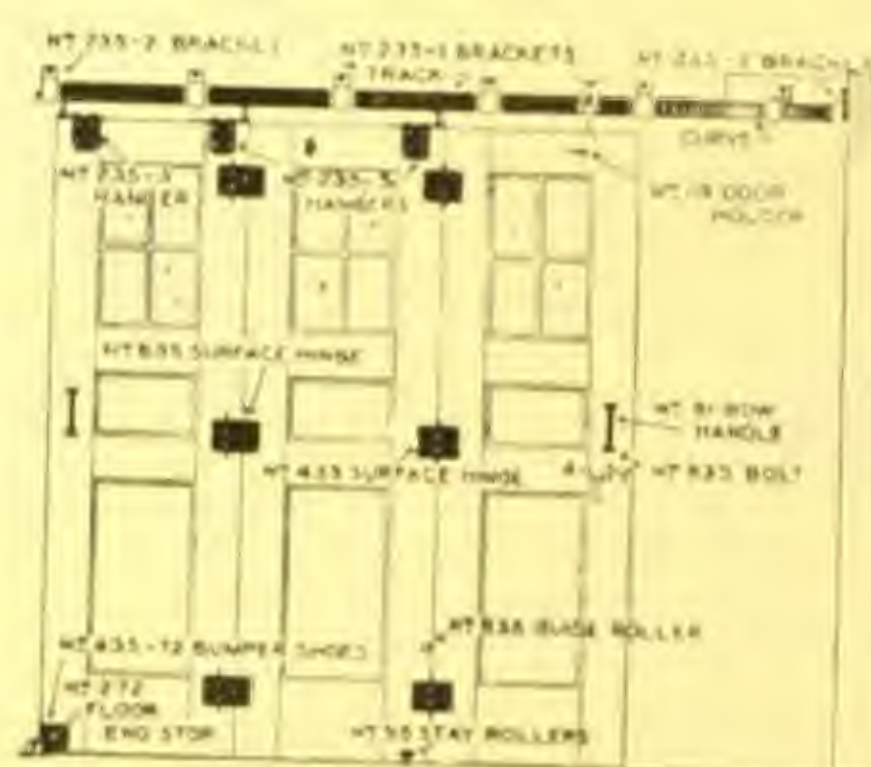
This equipment is frequently specified when a garage is not deep enough to fold the doors inside. "Slidaside" equipped doors, when opened, slide around the corner (regardless of the distance from the door jamb to the side wall), and stand at right angles to the door opening, along the inside wall of the building. The end door nearest to the side of the building to which the doors slide is used as the entrance door; it is therefore not necessary to open all the doors at the one time.



When the garage is not deep enough to fold the doors, use a "Slidaside."

### Adaptability

"Slidaside" hardware is adaptable to various doorway conditions and arrangements. (1) Single doors with wall space between jambs and side wall. (2) Single and double doors with jambs adjacent to side walls. (3) Pair of doors hinged together for opening with space between the jamb and side wall. (4) Three doors hinged together and sliding to one side. (5) Six doors, three of which are hinged together, sliding to the right, three of which are hinged together and sliding to the left.



"Slidaside" hardware applied to a 3-leaf doorway.

### Hardware Furnished

Each "Slidaside" set consists of the requisite quantity of tracks, brackets, hangers, floor guides, end stops, hinges, handles, door holders, stay rollers, locks and bolts, together with all bolts and screws for attachment, necessary to operate the number of doors for which the set is intended. Complete erection instructions are provided with each set of equipment.

### Door Sizes and Weights

It is recommended that individual doors (all of the same width) should not exceed 3 feet wide nor 250 lbs. in weight for "Slidetite" or "Slidaside" equipment. Heights may vary up to 12 feet, provided the weight limitations are not exceeded.

Molden, Weber & Co. Ltd. are always pleased to co-operate with the architect in the selection of R.W. equipment for any garage doorway.



## R-W FOLDING PARTITION DOOR HARDWARE

In many churches, colleges, Y.M.C.A. hostels and business houses, folding partition doors are installed so as to make possible the converting of large halls into many small rooms, or vice versa, at will. R.W. hardware is ideal for such installations. With No. 237 hardware the doors are hinged together in pairs, by invisible hinges, and each pair of doors operated as an independent unit. The weight of the doors is carried by hangers running in a trolley track above the opening. A floor track and guide is provided to guide the bottom of the doors. All the doors may be folded to one side or they may be divided at the centre and half of them folded each side. In either case a clear unobstructed opening is made with the doors completely folded against the wall. Generally, the door nearest the jamb toward which the doors fold, is pivoted to the floor and to the head jamb.

**PASSAGE DOORS.**—When the partition doors are small, one door can be used as a passage door from room to room when

the partition is closed. There should be an odd number of doors in the opening, the passage door being the odd one. It is not recommended for doors over 9 feet high.

**WICKET DOORS.**—When doors are large, a wicket door (i.e., a smaller door in one of the partition doors) can be placed in any of the doors except the pivot door.

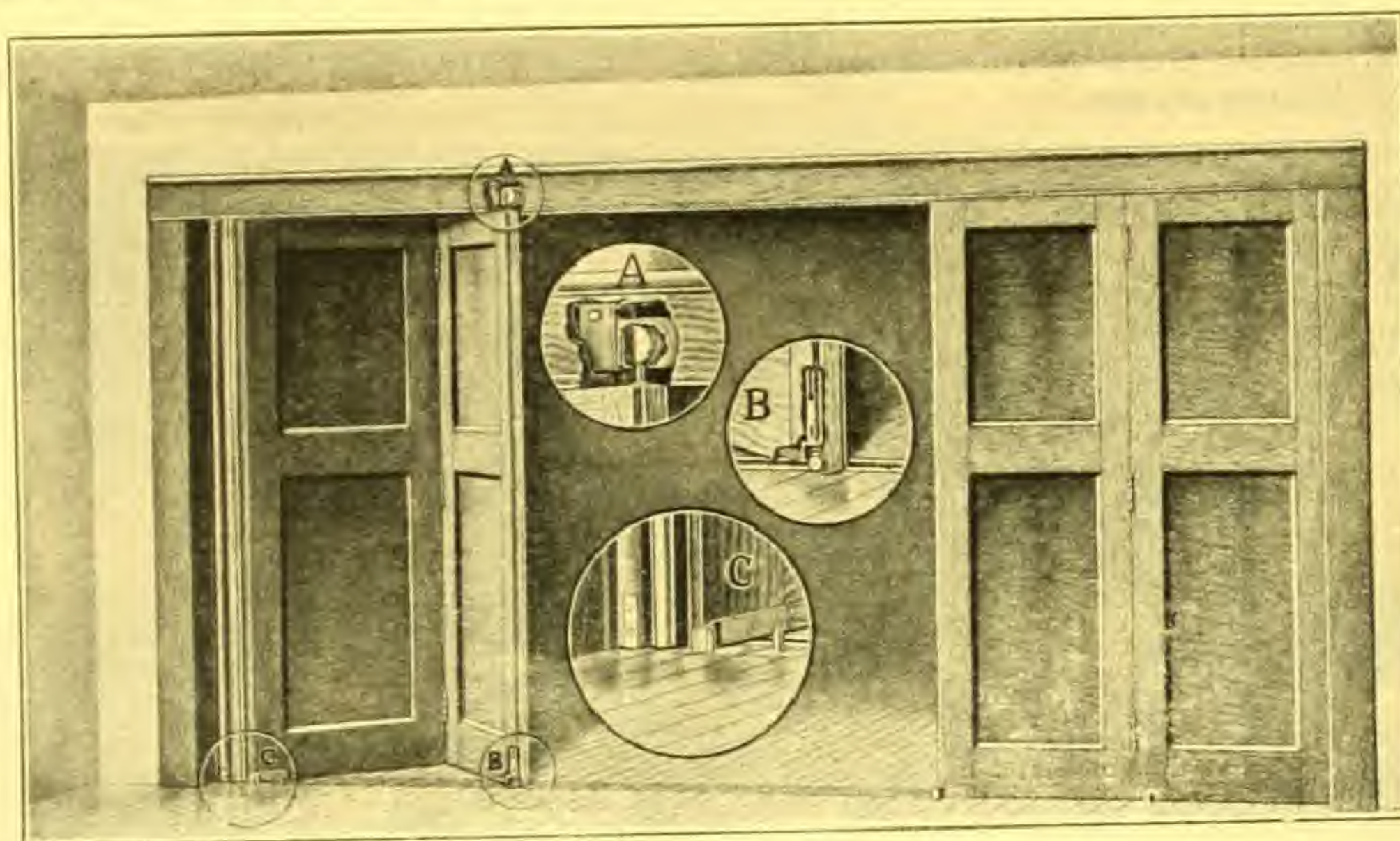
**HARDWARE FURNISHED.**—Complete hardware consisting of track, hangers, floor guide, floor track, bolts and hinges, with exposed parts in three finishes as desired: solid brass, plated or black is furnished with each set.

**SIZE OF DOORS.**—Thicknesses and weights of doors for each type of track are given in the table below. Doors approximately 3 feet wide are recommended.

Sets for Track No.	Thicknesses of Doors, Inches.	Max. Wt. of Doors—Lbs.	Wt. of Hardware per door—Lbs.
30½	1½	50	13
75	1½ to 2	110	17
33	2 to 2½	225	30
232	1½ to 2½	150	25

In the illustration, all six doors, in pairs, slide and fold to the left when equipped with R.W. No. 237 Hardware.

A—(in circle)—shows Bracket, Track and Hanger.



B—Shows Floor Guide and Floor Track.

C—Shows Pivot Plate, Stops and Stop Plate.

## "AIR-WAY" MULTIFOLD WINDOW HARDWARE

The "Air-Way" method of operating a series of windows in a row eliminates the need of hanging each sash independently on hinges attached to intermediate mullions.

The "Air-Way" method is to connect several sashes in a series so that they can be folded up and leave a clear space in any opening from 4 ft. 3 in. to 16 ft. 6 in. wide by 5 ft. high. When not in use they fold up conveniently at the side of the opening.

**INSTALLATION AND OPERATING.**—Tracks are fitted at the lintel and the sill, and sashes connected together by adjustable

sash links at both top and bottom, as shown in the diagram. On each adjustable link there is a small wheel which runs in the top and bottom tracks. This is what keeps the sash in place. The end sash is hinged to the jamb and this sash is the first to be opened. As this sash swings, the connecting link with the next one in the series pulls the entire string of sash in that direction.

As soon as the first sash is opened, the second sash may be opened in the same way and this in turn releases the lock which holds the third sash, and so on. The sashes must be opened in this order, the advantage being that when the sashes are all closed, locking the end sash locks the entire series against incorrect operation.

When open, each sash will remain in position to which it is opened without shaking or rattling. If desired, one, two or more windows may be opened without opening the entire series. The windows cannot interfere with external window screens.

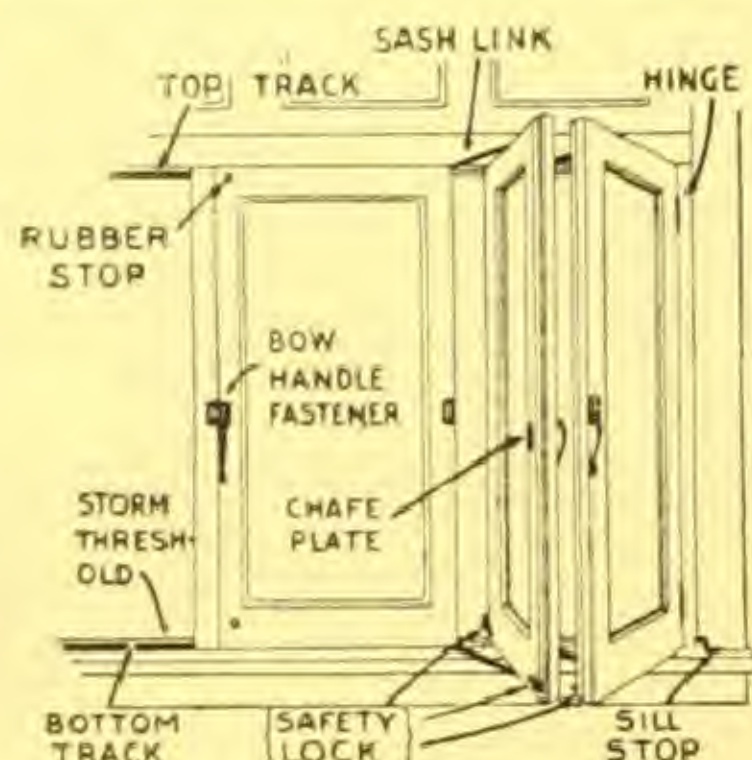
The brass threshold at the sill makes the installation perfectly weather-proof, rattle-proof and water-tight.

**HARDWARE.**—Complete hardware, consisting of upper and lower tracks, storm thresholds, butt hinges, sash links, safety locks, sill stops, rubber stops, chafing plates, thumb or bow handle fasteners are furnished in requisite quantity for operating each series. Tracks and thresholds are solid brass; other parts are made in three finishes: solid brass, brass plated and dead black. Blue prints for the joiner are provided with each set.

(Continued on next page)



It is like being out of doors with "Air-Way" equipped windows.



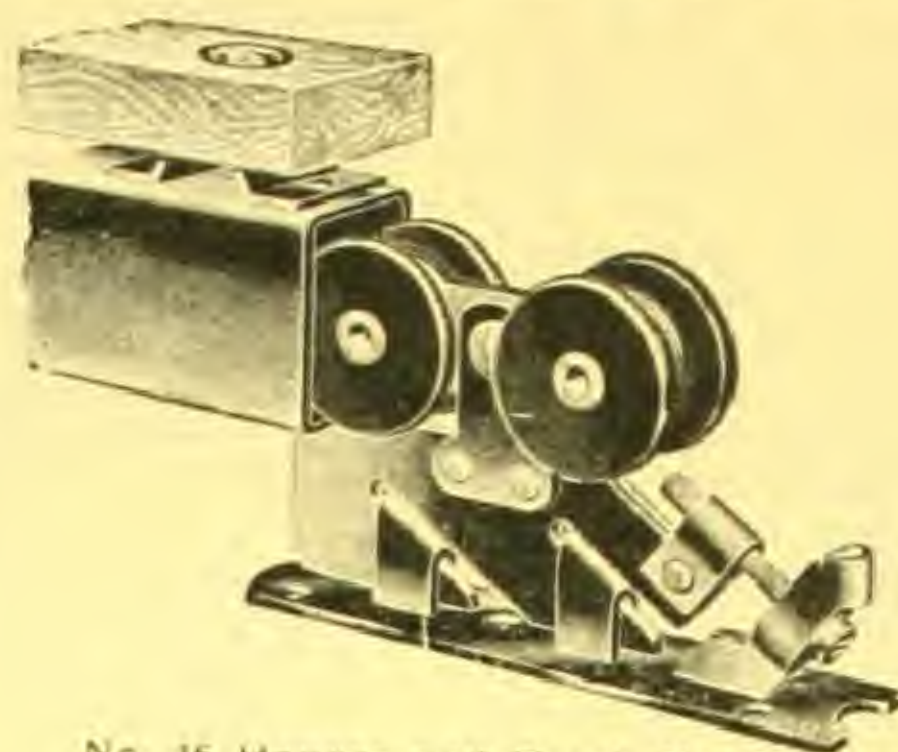


## R-W VANISHING AND SLIDING DOOR HARDWARE

R-W. disappearing or vanishing door hardware is adapted for use in residences for any type of opening where space saving is a factor; to separate living-room from dining-room, to close openings between bedrooms, for breakfast-rooms, linen closets and stair halls.

The doors silently disappear into the walls on ball bearing, adjustable overhead hangers. They may be installed in pairs to slide into two walls or singly. They will never jamb or stick.

R-W. vanishing door hardware comprises nine different sets of hangers



No. 16 Hanger and Track No. 31.

of various weights and construction. No. 16 hanger, illustrated on this page, is ball bearing with fibre wheels and track No. 31, and is suitable for operating individual doors of 150 lb. weight. The hardware furnished with this and other sets includes the requisite quantity of track, hangers, brackets, floor guides, locks and bolts necessary for the complete operation of a set of doors. Track, hangers and brackets are finished in rustless dead black. Details of application are provided with each set.

## R-W PARALLEL SLIDING DOOR HARDWARE

For doors weighing not more than 300 lbs. each, the illustrated hanger, with both vertical and lateral adjustment, running in R-W. standard No. 31 track, meets the requirements for most parallel sliding doors that are from 1 3/4 to 2 1/4 in. thick.

**OPERATION.**—Two or three doors suspended according to the set on two or three runs of track, sliding from jamb to jamb or to wall space on one or both sides of the opening. Tracks are provided with brackets for wall or ceiling attachment. Single doors can be used with this type hardware.



Typical Ball-Bearing Hanger.

**HARDWARE FURNISHED.**—Is assembled in complete sets. These include the requisite number of tracks, brackets, hangers, floor guides, handles, etc., to fully equip the size opening specified. Owing to the various combinations which may be used with the sets, locks and bolts are not included. Molden, Weber & Co. Ltd. will be pleased to offer suggestions regarding the combination of bolts and locks.

**TRACK ASSEMBLIES.**—Rolled steel tracks used singly or in assemblies with weather strips in between. Finish: black enamel.

**HANGERS.**—(1) Roller bearing with wheels of pressed steel. (2) Ball bearing with wheels drop forged. Finish: black enamel.

R-W. hardware for all sizes of wharf and warehouse doors weighing up to 3,000 lbs. each are available.

## R-W LIFT DOOR EQUIPMENT

R-W. lift door equipment is designed for super-excellent service, smoothness and noiselessness in operating single speed, two and three speed, and bi-parting doors. Good lift service cannot be maintained with inferior door hangers and closers. The advantages of high speed elevators may be lost if time must be wasted at each stop struggling with the doors. Lift doors equipped with R-W. hardware close easily, noiselessly and completely with the one motion.

R-W. hangers, closers, checking devices, safety interlocks are separate mechanisms, yet so constructed that they synchronise perfectly, forming a complete unit control.

**HANGERS.**—Evenly distribute the weight of the doors, and ensure smooth and silent operation.

**CLOSERS.**—Designed to allow easy and rapid operation. Quietness is assured by an adjustable liquid check.

**INTERLOCKS.**—Electric, electro-mechanical, or mechanical may be added to the above closers at any time without changing the closer mechanism.

**ELEVATOR SIGNAL SYSTEMS.**—All forms of signal systems from the simplest mechanical reset annunciator and dial indicator to the most complicated flashlight.



No. 827 Hanger and No. 743 Closer for Single Sliding Doors Weighing up to 200 lbs.

## "OVER-WAY" TROLLEY TRACK CONVEYING EQUIPMENT

The "Over-Way" conveying equipment constitutes one of the most efficient labour-saving devices manufactured for any size factory or plant for handling loads up to 2500 lbs. This equipment not only saves labour, time and floor space, but can be designed to take up the conveying from the floor, leaving the aisles free and thus making possible the utilisation of the ceiling for storage space.

Installations consisting of from a few feet of track and one carrier to intricate curved systems with miles of track, many crossovers, switches, turntables



"Over-Way" Equipment Serving Two Dipping Tanks at one time; one Tank contains a light paint, the other a dark paint.

and hundreds of carriers have paid for themselves in one year through reducing handling costs.

**EQUIPMENT.**—Includes overhead tracks, brackets, trolleys, carriers, hangers, switches, crossovers, turntables, and hoists. To ensure proper erection, detail drawings are furnished and all material marked to correspond.

**INFORMATION REQUIRED.**—On receipt of the following information, detailed drawings of equipment to meet requirements will be submitted for approval.

Always send sketch, giving correct dimensions and proposed layout of tracks. State weight and size of maximum load, whether for constant or occasional use, and whether track will be used for storage purpose. Send details of overhead construction so proper brackets will be provided.



# SARGENT & COMPANY

NEW HAVEN, CONNECTICUT, U.S.A.

**SARGENT**

Australasian Agents:

**MOLDEN, WEBER & CO. LTD.**

P.O. Box 1349J, SYDNEY, N.S.W.

Also At

BRISBANE

MELBOURNE

ADELAIDE

WELLINGTON

27b

S.A.A. File No.

## PERMANENTLY RUSTLESS HARDWARE

Resistance to the marring and evil effects of rust and corrosion has led to the general use of copper, brass and bronze for hardware and other building materials.

In the hardware here illustrated we have a combination of the rustless and enduring qualities of the white bronze from which it is made, with all the

charm of hand-forged wrought iron of former days which it resembles.

Used with plank, batten or panelled doors it is particularly attractive; its rust-resisting qualities will not permit it to stain or discolour the woodwork. Use will enhance its beauty and maintain the lasting effect of forged iron.



## SARGENT BARCELONA DESIGN

This design is recommended for use in modern homes inspired by the work of craftsmen of older times.

Molden, Weber & Co. Ltd. will be glad to consult with you on all problems pertaining to the use of this beautiful hardware and other Sargent products described on the following two pages.

(Continued on next page)



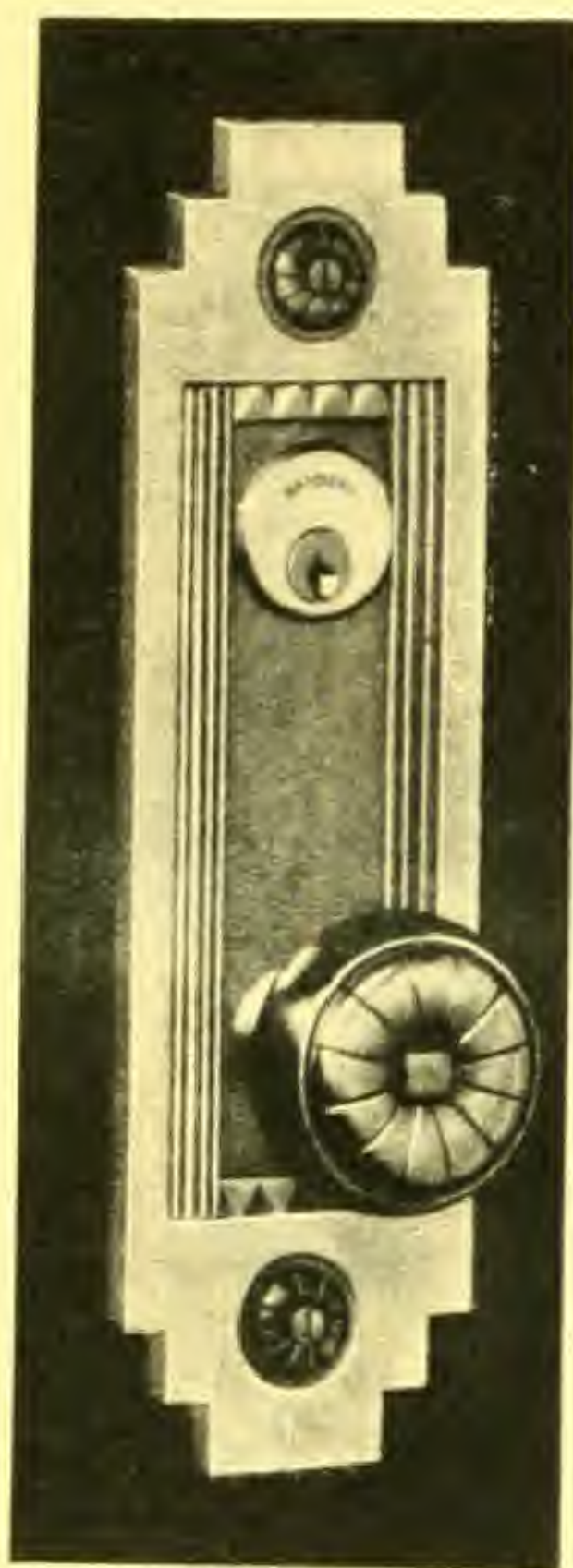
## MODERN DESIGNS IN SARGENT HARDWARE

The new designs of hardware illustrated on this page show the influence of current thought in the architectural field. These examples of metal work produced by Sargent are characteristic of the movement away from traditional forms of artistic expression. They are appropriate for use in the buildings designed by progressive architects in a style that has not yet reached its fullest development.

The designs, which bear the identifying trade numbers, are the work of Sargent designers and can be supplied for any

building. All these designs have been executed in the Sargent workshops by experienced metal workers whose craftsmanship is unexcelled.

In harmony with the use in modern buildings of different metals and finishes, these designs can be supplied in bronze and brass in natural colours and in the established architectural finishes, also in white bronze, silvery in tone and the same colour all through. Combinations of two metals or finishes can sometimes be furnished.



Door Knob No. 1822 MD.  
2½ inches.

Escutcheon No. 7876 MD.  
10½ x 3 inches.

Made in Cast Bronze and Cast Brass with all finishes. Also made in Internal Door Sets, Bathroom Door Sets, Bell Pushes (Electric), Push Plates, Pull Handles and Letter Plates.



R.M. Radial Design.

Knob, 2 inches.

Escutcheon, 6 x 1½ inches.

Made in Wrought Bronze and Brass, and Wrought Steel, with finishes to harmonise with the design. Furnished with glass knob if so desired. Also made in External Door Sets.

This design has been produced to meet the architectural demand for smaller plate design.

These Sargent designs represent but a few of the hundreds which include locks and complete hardware finishings in modern and period designs, suitable for fully equipping every type of building from the modest home to the mansion and public building.



M.T. Design Lockset.

Knob, 2½ inches.

Plate, 3½ x 4½ inches.

Made in Cast Bronze and Cast Brass. These Locks have special features. The knobs are demountable and the cylinders interchangeable. Produced in a number of designs other than shown, with all finishes.



Door Knob No. 1822 ME.  
2½ x 1½ inches.

Escutcheon No. 7876 ME.  
9 x 2½ inches.

Made in Cast Bronze and Cast Brass, with all finishes. The design is also available in Internal Door Sets and other hardware furnishings to match.

## ADVANTAGES OF GOOD HARDWARE

Good hardware—the dependable kind—is not extravagant; the whole amount is a very small item on the total cost of a building. Poor locks, hinges and hardware generally will cause endless trouble, while trimmings that do not harmonise with the building will be an annoyance.

The mechanism in all Sargent locksets are designed for strength, long service and perfect action. For external doors, Sargent Easy Spring Cylinder Locks, used with either the Entrance Door Handle or the Escutcheon with

Knob or Lever Handle, will provide the utmost safety, security and control.

For internal doors Sargent Easy Spring Locks give the greatest satisfaction. The Easy Spring enables the latch bolt to work freely, so that the door DOES NOT have to be slammed—it latches GENTLY as it closes.

Morden, Weber & Co. Ltd. are always ready to advise the architect on the hardware equipment most suitable for any type of building.



## SARGENT'S NEW DOOR CLOSER

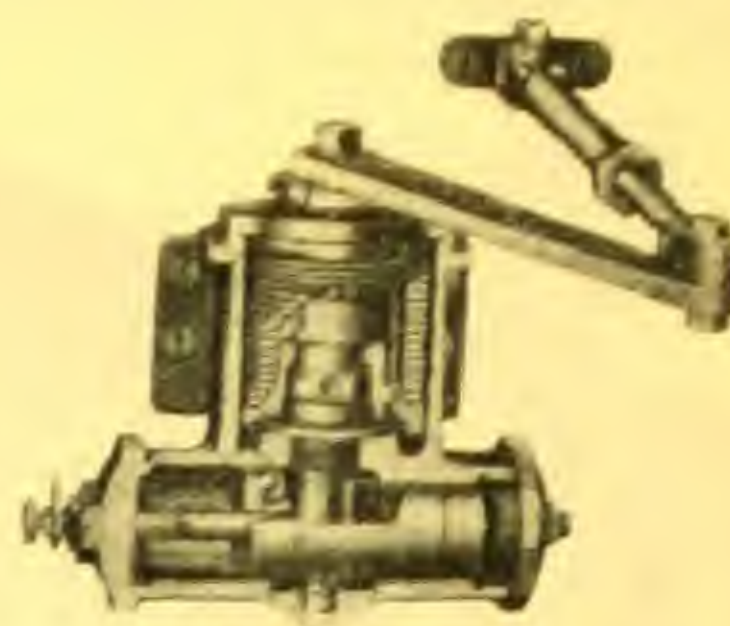
Sargent Door Closers have been recognised for many years as standards of quality, dependable in effective operation. Now, to meet the latest requirements of the most progressive architects, engineers, building managers, owners, Sargent offers a new modern Door Closer or Controller.

Extensive research and experiment have resulted in the noiseless and complete control of the closing of any swinging door at the desired rate of speed. This new Sargent Door Closer is made in sizes suitable for all doors, from the simple passage door to the heavy entrance doors of the most modern commercial structures.

The control valve, of dual type, may be set for any one of three control points, 90, 45 or 10 degrees. The speed valve regulates the speed of closing and can be readily adjusted for changing draught conditions. This Door Closer offers the greatest possibilities of control. In order that the door may not strike against a wall or a piece of furniture, a valve is provided to stop the opening at about 90 degrees. This Door Closer is reversible, right or left hand, without changing any of the parts and without affecting any of its other efficient features. Each Sargent Door Closer is packed in a strong fibre box without excelsior or other loose packing. To make application and adjustment simple, a template and code of directions are packed with each Closer.



Hold-Open Device.



Cut Open View.

## SIZES AND APPLICATION.

With Hold-Open Device.	Without Hold-Open Device.	Application.
No. 61	No. 41	For heavy screen or light inside doors.
No. 62	No. 42	For light inside doors not exceeding 7ft. x 3ft.
No. 63	No. 43	For medium inside and light outside doors not exceeding 7ft. x 3ft.
No. 64	No. 44	For heavy inside and medium outside doors not exceeding 7ft. x 3ft.
No. 65	No. 45	For heavy outside doors not exceeding 7ft. x 3ft.
No. 66	No. 46	For extra heavy and wide outside doors not exceeding 8ft. x 4ft.

## FEATURES

- Case.**—Spring and piston chamber in relative size give a pleasing, symmetrical appearance. The back plate is cast solid with the case. No screws to work loose. No undue strain on any one part.
- Springs.**—Highly tempered manganese carbon steel wire, wound in a helical coil. From 136 in. in length for the smallest size to 184 in. for the largest. Great elasticity, with fine graduations of power adjustment are obtained.
- Piston.**—Of cast metal of high tensile strength, of the rack and pinion type, giving a balanced wear and a continuous travel when the door is in motion. The piston is always in constant control. Of large diameter, it is machined with the case to a tolerance of 1/1000th of an inch—smooth and effective operation is guaranteed.
- Arms.**—Of cold rolled steel without swivel adjustments. Adjustments can be made without loosening the arm from the Closer or removing the screws from the foot of the arm. Arms are of extra length—to permit Closer to be placed further from the butts, still allowing the door to open the full 180 degrees without strain.

5. **Hold-Open Device.**—A door may be held open at 10, 45, 90 or 180 degrees, as convenience requires, and without strain on the Closer or butts. The pawl on the arm engages with projections on the cap of the Closer. All unusual requirements are met for hospital, school, booth, office doors.

6. **Spindle and Packing.**—Spindle and pinion are in one piece of hot forged alloy steel. The spindle is strongly seated in a bearing at the bottom of the case and held in alignment at four points. The piston chamber has enough overflow space to relieve the spindle packing from excessive strain.

7. **Liquid.**—Piston chambers are filled with a liquid that long experience has proved most satisfactory.

8. **Brackets.**—When desirable to place the Closer inside where doors open out, the usual soffit, flush and corner, hanking brackets for circular top doors are designed to care for a great range of varying conditions.

9. **Finish and Colour.**—Standard finish is dark, rich bronze to harmonize with various wood finishes. Other finishes can be furnished as desired.



## SARGENT CYLINDER PADLOCKS

Where the utmost security is desired the architect is always safe in specifying Sargent PIN TUMBLER Cylinder Padlocks. Self-locking spring shackles, locking with a rigidity that can be released only with the key. Shackles are either of carbon-tempered steel that resists back-saw or cutting devices, or of hard drawn polished bronze. They are made with medium or extra-length shackles. Sargent Cylinder Padlocks are of the real pin-tumbler type that responds only to the individual key. They can be had with attached chains—with keyhole cover—and master keyed as required.



## SARGENT TRANSOM LIFTS

Sargent Transom Lifts, which are specially adapted for transoms in stores, banks and public buildings, etc., are available in types suitable for top, bottom and centre hung transoms opening in or out. They are of the sliding rod type and made of steel or bronze with rod diameters of 1/4, 5/16, 3/8, 7/16 in., and 1/2, 5/8, 3/4 in., respectively. Lengths are from 3 to 10 ft., inclusive. Finishes are as follows:—Steel: Copper plated and other popular finishes; Bronze: Polished, lacquered and regular finishes, as desired. These Transom Lifts open and close smoothly and silently, and can be adapted to operate the transom in 10 different positions.

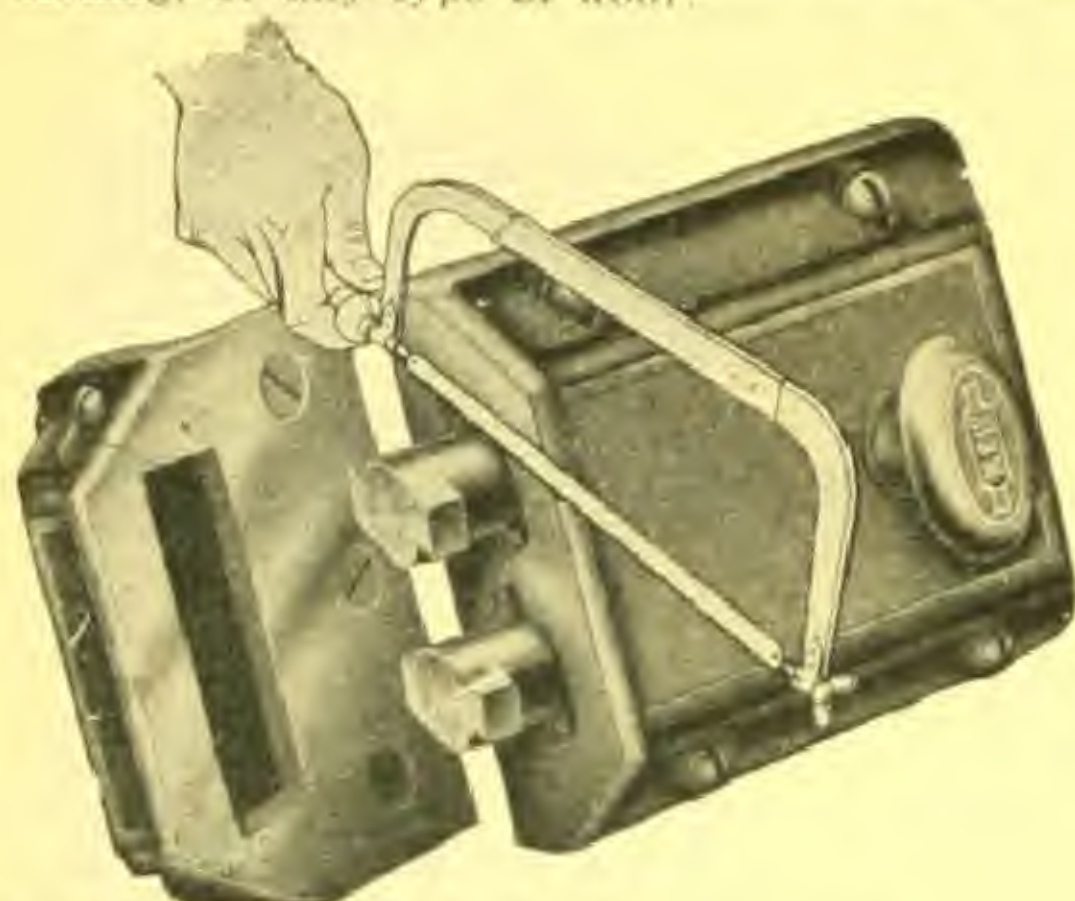


<div>27b</div> <div>S.A.A. File No.</div>	<div>C. J. WHITE &amp; SONS PTY. LTD.</div> <div>Hardware Merchants, Locksmiths, Engineers</div> <div>Showrooms and Office:</div> <div>362-4 POST OFFICE PLACE, MELBOURNE (Between Elizabeth &amp; Queen Sts.)</div> <div>Works:</div> <div>ROBERTSON STREET, KENSINGTON, VICTORIA.</div> <div>Established 1892</div>	<div>KEIL LOCKS</div> <div>JOHN TANN SAFES</div>
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## KEIL LOCKS

## Features

Keil Jemmy-proof Locks cannot be forced, picked or sawn through because of the hardened steel rollers within the bolts which shoot and turn like a gun breech. Tested and approved by Insurance Underwriters, they are absolutely burglar-proof, and none of the known methods of attack can succeed. The door frame will fail before the bolts will give. Made for swing, double swing, sliding, or any type of door.



## Manufacture and Types Available

Made in Rim, Mortise, Garage, Front and Store Doors. Pin-tumbler Keys, Master-keyed, or in sets; cast bronze cases. The types available are—Night Latch, Rim Dead, Double Cylinder Rim Dead, Single and Double Cylinder Mortise, Night Latches for inner doors; Rim Dead for factory and store doors; Double Cylinder Rim for glass street doors; Single Bar Mortise for sliding or double swing.

## Keys and Service

We cut all keys on the Keil Automatic Duplicator, which guarantees absolute precision at mass production prices. Car Keys cut by code without samples. Master-keying.



Entrance Gates at residence of the late Sir William McBeath, at Toorak, Victoria.

We quote to burglar-proof any building, and specialise in Burglar Alarms, Electric Door Openers, Keyhole and Bottle Locks.

## White Locks

We are actual makers of Iron and Brass Padlocks; Cabinet, Mortise and Rim Locks of highest quality only. White Locks are used in all Government Departments. White's 6-Lever, Massive Padlocks, with Hacksaw-proof Shackles, for Warehouse Doors.

## JOHN TANN SAFES AND STRONGROOMS

## Prestige

John Tann Limited are the world's oldest makers of Safes and Strongrooms. No John Tann Burglar-Proof Safe has ever been opened by a burglar, nor their Fireproof Safes destroyed by fire. Supplied to the Bank of England and the Royal Mint.

Oxy-acetylene and Explosive-proof Safes and Strongrooms in all sizes. Wall Safes, Jewel Boxes, Cash Boxes, Iron Chests.

## Engineering and Consultation Service

Let us advise you upon your security problems. The same service that is so freely used by the great banks is at your disposal without obligation. We can convert Safes and Strongrooms already in use to Explosive-proof.



## Night Banking Systems

In modern times, no bank job is complete if a night-banking system is not specified. Fear of safe-breakers and a natural desire to be rid of the responsibility of guarding cash takings in shop, cafe, theatre, etc., overnight, has led to the emanation of a novel system of night-banking. To provide clients who wish to bank sums of money or deposit jewels or other valuables in safe-keeping after banking hours, wallets are supplied, into which the valuables are placed. At any time these can be put through a slot in the bank wall (which is first opened by a special key provided), whence, through a heavily-protected chute, they are forced into the strong-room. This system is guaranteed fool-proof, fire-proof and burglar-proof, and a typical example may be seen at the Bank of Australasia Limited, in Collins Street, Melbourne.

## Wrought Iron

For variety of Entrance Gates, Railings, Roller Shutters, Collapsible Gates, Stair Balustrades, Lift Enclosures, Lamps, Fire Dogs, Brackets, Grates, Counter Fittings, Bronze Memorial Tablets, we are the premier firm; also for fine Bronze and Statuary Castings.

See our metal work at T. & G., National Bank, Commercial Bank, Bankers' and Traders', Vaughan House, St. Paul's Synagogue, Victoria Palace, etc.

## General Hardware

General Builders' Hardware, Motor, Horse and Hand Lawn Mowers, Gardening and Golf Equipment, Golf Tractors, Electric, Spiked, Motor and Hand Rollers. These are just a few of our lines which are on view at our showrooms. Our representative will call and give particulars at any time.



## SECTION K

[Containing S.A.A. Filing Section No. 28]

## FURNISHINGS





# **AUSTRALIAN METAL PRODUCTS PTY. LTD.**

GENERAL OFFICE AND PLANT:

**REAR NICHOLSON & SCOTCHMER STREETS  
FITZROY, VICTORIA**

Interstate Distributors:

SYDNEY—H. E. McClelland, 55 York Street,

ADELAIDE—Messrs. George Willis & Co. Ltd.,  
31 Grenfell Street.

BRISBANE—Messrs. Bernays & Anderson,  
125 Adelaide Street.

PERTH—Messrs. George Willis & Co. Ltd.,  
156 St. George's Terrace.

**28a**

S.A.A. File No.

**SANYMETAL**

[For Other Products, See Page 142]

## **Products**

Sanymetal Partitions are built for Toilets, Lavatories, Urinals, Dressing Rooms, Showers, Smoke Screens, Ward Screens and Wainscot, for Industrial, Office, Commercial and Public Buildings, as well as for Schools, Churches, Hospitals, and Institutional Buildings, etc.

## **The New Sanymetal Unit Panel Toilet Partition**

This new Sanymetal Toilet Partition responds to a popular demand for a metal partition embodying every requisite for a good appearance and long life, and, combined with simplicity of design, represents an economic proposition unequalled.

## **General**

A simple and substantial design (embodying several basic patents), neat and clean cut appearance characterise these products. Rust resisting finish, tight joints, elimination of corners and cracks that collect dust and dirt, turned-in edges and special base shoes, all contribute to the exceptional sanitary qualities of these products.

## **Construction**

"Sanymetal" Toilet Sections are usually made up of two units—a panelled partition joined to a supporting post, and a door. Partition panels are designed with a neat rail at top and bottom, and finished off with attractive drawn mold. Post and panel are welded into one rigid unit and delivered completely assembled, saving time on the job. Doors are made of drawn molded sections to all sides. Posts are fitted with polished aluminium top casting carrying pipe rail bracing, and secured to floor with special sanitary base casting. This base shoe is also polished aluminium, self-draining, full three inches high, coved at bottom, and adjustable to uneven floors. Material used is 16-gauge full cold rolled sheets. All metal edges, etc., are concealed and interlocked. Our method of construction eliminates all unsightly spot welds, projecting bolts, nuts and screws. All doors are fitted with "Sanymetal" full floating ball-bearing gravity roller hinges, latch and bumper. All rails and stiles are drawn—not bent under a press. Thus clean, sharp corners are obtained as in the best style of metal doors.

## **Erection**

Erection is simple and easy. No drilling of partitions is required on the job. Partitions are securely fastened at floor and walls, so that installation remains rigid, shake and rattle proof. Doors do not bang.

## **Finish**

Particular attention is given to finish. Partitions and Doors present an impervious hard enamelled surface, very easy to clean, and non-absorbent of moisture. After a priming coat of rust-resisting paint, two coats of high-grade enamel are then applied and each coat baked on at a high temperature. Standard colours are Olive Green and Battleship Grey. When delicate colours, such as white or cream, are desired, it is preferable to use lacquer finishes baked hard, as we have found from experience that this is more satisfactory for such colours.

## **Sizes**

"Sanymetal" partitions can be constructed to any reasonable size to suit Architects' requirements.

Recommended standard sizes for toilet partitions are 3 ft. wide, measured c. to c. of stalls and 5 ft. from wall to centre of post; height of partition, 9 in. clear of floor, 5 ft. 3 in. height of panel and 9 in. to centre line of rail; total overall height of 6 ft. 9 in.

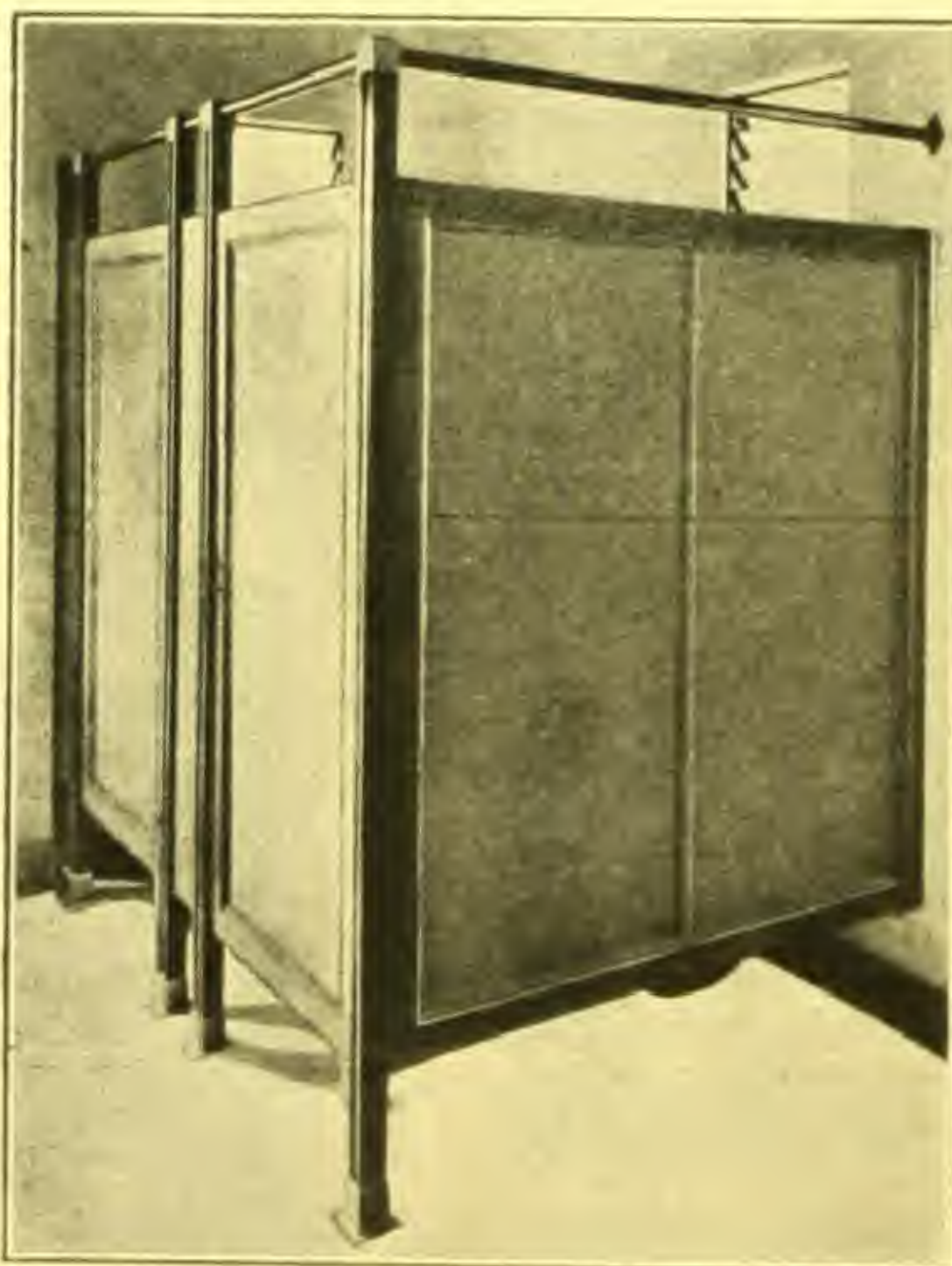
## **Sanymetal Full-Floating Ball-Bearing Gravity Roller Hinges**

These are springless, operating entirely from force of gravity. They are strong, simple, positive in action, and containing nothing to break or wear out. The lower hinge, containing the gravity-operated mechanism, is completely encased and assembled as a unit in the factory. Within this, and thoroughly protected from dirt and moisture, are the inclined track and hardened steel roller secured by a special alloy steel self-lubricating pin. The hinge is universal in its adaptability to any type of swing door of any material. Doors may be self-closing, self-opening, double-acting, out-swinging or in-swinging. They may come to rest at any desired angle.

## **Service to Architects**

Any enquiries on particular problems relating to other uses for "Sanymetal" partitions are welcomed by the Manufacturers.

Price-lists and information on crating and delivery will be mailed at your request.



Sanymetal Toilet Partitions at the Taxation Offices, Melbourne.

## **Sanymetal Partitions**

are

**Hygienic, Rigid, Less  
Costly, Easily Fixed,  
High-Class Appearance**

(Continued on next page)





(Continued on next page)  
**RAMSAY'S CATALOGUE**



## ARCHITECT'S SPECIFICATION

## METAL PARTITIONS

Partitions indicated on plans (or describe location) shall be entirely constructed of hollow metal furniture steel and as follows:—

## PANEL CONSTRUCTION

Each partition shall be made of drawn hollow metal interlocking mouldings with all edges concealed, having 16 gauge full cold rolled panel sheets securely locked into moulded rails at top and bottom and channel stile against wall and securely welded to front door post forming unit panel. Partitions shall be fastened to wall by means of an O.G. drawn adjustable channel with at least three concealed screws or toggle bolts as required. Back stile of partition shall be inserted into channel and secured with screws through top and bottom of channel.

## POSTS AND RAILS

The front posts of partitions shall be of drawn hollow metal forming sunken panels on four sides.

Head rail brace shall be of 1½-in. diameter drawn hollow metal tubing.

Polished aluminium self-draining base casting, for setting front post of partition to floor with head cap of similar material, to take head rail bracing, shall be furnished.

## DOORS AND HARDWARE

Doors shall be made of 3½ inches wide by 1 inch thick reinforced drawn metal stiles and rails fitted with 16 gauge panel sheet similar to partitions.

Doors shall be equipped with encased "Sanymetal" full floating ball-bearing gravity roller hinges with insured adjustment to make doors (outswinging), (inswinging), (self-closing), (self-opening), and with latch and bumper.

All door hardware shall be of polished aluminium and applied with nickel-plated bolts and cap nuts.

## FINISH

All metal shall be thoroughly sanded, washed with benzine, filled and primed, and two coats of Olive Green (or Battleship Gray) baked on, or (if White or Cream finish is specified) and two coats of White (or Cream) applied in a lacquer finish.

## SUPPLY (OR INSTALLATION)

The whole of the above metal partitions shall be supplied and installed by the Australian Metal Products Pty. Ltd.,

or

The whole of the above metal partitions included in this contract shall be supplied and delivered at the site by the Australian Metal Products Pty. Ltd. The Contractor shall install in a workmanlike manner and in accordance with the manufacturer's instructions.

## LIST OF TYPICAL INSTALLATIONS

New T. & G. Building, Sydney—A. and K. Henderson  
Perth University, Western Australia—Rodney Alsop and H. Bramwell Smith  
Northcote Town Hall, Victoria—H. A. Norris  
Taxation Offices, Melbourne—Oakley and Parkes  
Titles Offices, Melbourne—Oakley and Parkes  
"Vaughan" Building, Melbourne—Gawler & Drummond

Women's Hospital, Carlton, Victoria—A. A. Fritsch.  
Wholesale Fruit Market, Melbourne.  
Tramway Depot, Camberwell, Vic.—Tramway Board.  
Julius Kayser Building, Richmond, Victoria—J. Plottel  
Thos. Evans Building, Melbourne—Hare, Alder, Peck and Lacey.  
C. of E. Girls' Grammar School, South Yarra—Gawler and Drummond

## HOSPITAL INSTALLATIONS

## General

The outstanding sanitary value of metal partitions makes them specially desirable for hospital and allied uses. On account of popular demand everywhere for semi-privacy in wards, "Sanymetal" cubicles are coming into general use for this purpose.

"Sanymetal" provides a rigid, good-looking, easily cleaned, fire-proof and highly sanitary partition at a practical cost.

## Construction

"Sanymetal" hospital cubicles have the same qualities of substantial, clean-cut and rattle-proof construction that are characteristic of other "Sanymetal" products.

**Posts.**—Posts are of 2-in. square, hollow-drawn metal, forming sunken panels on four sides. Each post is capped at the head with an aluminium top casting and at the foot with an aluminium base casting.

**Bottom Panel.**—Consists of 16 gauge, full-rolled cold sheets. Panel may be moulded or flush type, although the latter is preferable in view of its more hygienic qualities.

**Top Panel.**—Glass frame is made of drawn steel mouldings welded into one continuous piece and put in by spring clips without the use of screws. The frames can be glazed with any type of approved glass.

**Top Rail.**—Top rail over glass panel is formed by two drawn channels of 1½ x 1 in., fastened between posts.

**Head Rail.**—Head rails brace between adjacent cubicles is 1½ x 1 in. tubing. Where curtains are used, the head rail is utilised for a curtain rod.

**Finish.**—Standard finishes of Olive Green and Battleship Grey baked enamels, or lacquered finishes of White and Cream can be applied as previously stated.

**Doors.**—If desired, doors instead of curtains will be supplied. These are similar in all respects to those described in the above specification, and are hung on springless, self-acting, "Sanymetal" gravity roller hinges.



Typical example of Sanymetal Hospital Partitions.

## Service

We solicit your enquiries in all matters concerning hospital cubicles and screens. Our service is at your command whenever required, and layouts will be submitted without obligation.



SUNRISE

# MALLEYS LIMITED

MANUFACTURERS OF STEEL LOCKERS  
AND SHELVING

GENERAL SHEETMETAL WORKERS

Head Office and Showroom:  
50-52 MOUNTAIN STREET, SYDNEY

Factory:  
McEVoy STREET, ALEXANDRIA

Postal Address: Box 2, G.P.O., George Street West, Sydney.

28a

S.A.A. File No.

[For Other Products, See Pages 98 and 342]

## Malley's Steel Shelving

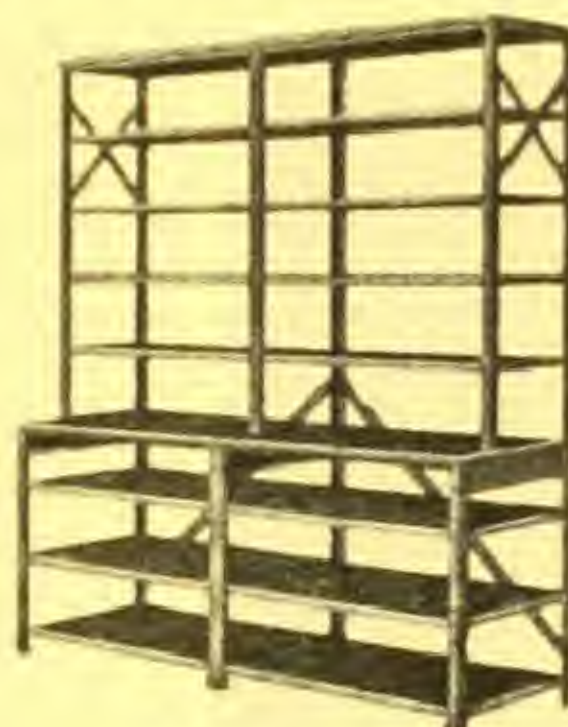
Simple, durable, exceptionally strong, and fully interchangeable; readily erected with the aid of a screwdriver; quickly disassembled and re-erected.

### MALLEY STANDARD SPECIFICATION

Uprights made from 16-gauge, cold-formed angles, 3, 6, 7, 8, 9 and 10 feet high; a combination of the above will give any desired height; punched for 2 or 3 inch adjustment.



High and Low Shelf  
Partitions.



Ledge Shelving.

Shelves are 9, 12, 15, 18, 24, 30 and 36 inches deep; 24, 30, 36, 42 and 48 inches wide, made of No. 18 gauge steel. Reinforcing angles are supplied for heavy duty shelving. The 24 and 30 inch widths are used to fill out shelving in lengths not a multiple of 36 inches.

Flat Steel Backs and Divisions, same heights as uprights, are punched for attaching to flanges of the uprights of the shelves, and at equal distances from top and bottom edges to make them reversible.

Dividers of No. 24 gauge are 6, 8, 10, 12, 14, 16, 18 and 24 inches high by all shelf depths (flanged top and bottom for bolting to adjoining shelves). Beaded front and back.

Bin Fronts (with continuous label holders when desired) are readily attached to uprights by steel clips. Counter shelves and hinged doors with locks also supplied.

Finish.—Olive Green Baked Enamel. Special finishes at additional cost.



Skeleton Shelving.



Shelving with Backs, Solid  
Uprights and Base Plates.

## Malley's Steel Lockers

Malley's steel lockers are made of cold rolled steel in single tier, full height, two, three or four feet high, in batteries of any number, in single or double rows (back to back).

Stock sizes of Malley steel lockers, width x depth x height, inches:—

Single Tier	2, 3, or 4 Tier
*15 x 15 x 72 in.	*15 x 15 x 72 in.
18 x 18 x 72 in.	18 x 18 x 72 in.
20 x 20 x 72 in.	*20 x 20 x 72 in.

\*Carried in stock.

Sizes other than those listed will be made up to order.

### LOCKER SPECIFICATIONS—SINGLE TIER

Door.—Full cold-rolled, patent levelled 20 gauge special enamelling steel, with reinforcement at each vertical edge and centre hemmed flange at each horizontal edge.

Frames.—Uprights 1 in. x 1 in. x 16 gauge cold-formed angles, cross members carried out in the same material and welded.

Body.—The remaining parts of locker are made of 24-gauge steel.

Locking Device.—Concealed type 3-way design of stamped steel, and cylinder lock with duplicate flat keys—all locks being different.

Ventilation.—Standard louvre ventilation in doors of all lockers, 8 inches wide, 5-16th inches deep.

Hinges.—Reinforced, full looped, 5-knuckle strap hinge, permitting door to open 180 degrees.

Legs.—Front legs integral with frame, with panels inserted; no receptacle to harbour dust in Malley pattern.

Equipment.—Single tier, one hat shelf, one three-prong and two single-prong hooks—one for each wall.

Two-tier lockers, no shelf, two single-prong hooks—one for each wall.

Finish.—Olive Green Baked Enamel.



Single Tier  
Locker.



Single 4-Tier Locker.



Battery of Single Tier  
Lockers.



# WORMALD BROS. LIMITED

FIRE PROTECTION ENGINEERS

SINCE 1889

CITY OFFICE: 19 BLIGH ST., SYDNEY. FACTORY: YOUNG ST., WATERLOO, SYDNEY

BRANCHES:

MELBOURNE—180 Bay St., Port Melbourne.

BRISBANE—"City Buildings," Edwards St.

NEW ZEALAND—"T. &amp; G." Buildings, Wellington.

ADELAIDE—Bowden.

PERTH—Wellington St.

28a

S.A.A. File No.



[For Other Products, See Pages 148, 158, 244 and 308]

## "STEELBILT" STEEL STORAGE PRODUCTS

### Products—and Advantages over Wood

"Steelbilt" Products include Standard Steel Shelving, Lockers, Cupboards, Plan Cabinets, Filing Cabinets, Stock Bins, Hospital Furniture, Library Shelving, etc. They are all made entirely of steel in Australia of Australian material. These products are far superior to wood in every way, yet compare favourably in prices. They will not burn, are stronger and cleaner, will not rot or chip, and will last for a lifetime.

### Standard Lockers

Standard Lockers are made in four different tiers, as shown in the accompanying illustration. The first is a full-tier clothes locker with hat shelf and both centre and side hooks. This is a dustproof, neat executive wardrobe for office use, which gives good ventilation. The next is a well-ventilated locker giving two individual coat and hat lockers, which are ideal for office staff use where space will not permit each member having a full tier. The other two tiers show four and six lockers, respectively. These are of great benefit for factory staffs and schools, etc., and each locker has two individual keys. The illustration only shows one type of door. Other fronts can be had with wire mesh or perforated steel. This latter has been very successfully used in a number of Golf Clubs where "Steelbilt" has been installed.



Various Standard "Steelbilt" Lockers.

### Locker Sizes and Construction

Standard Lockers are made in tiers, 6 ft. high x 15 in. x 15 in., with extra strong legs made of 14-gauge steel. They are all equipped with 3-way locking device operated by flat key (in duplicate). Every lock is different. The hinges are specially constructed so that no bolt or screw appears on front of door. This makes them particularly neat.

### Standard Shelving

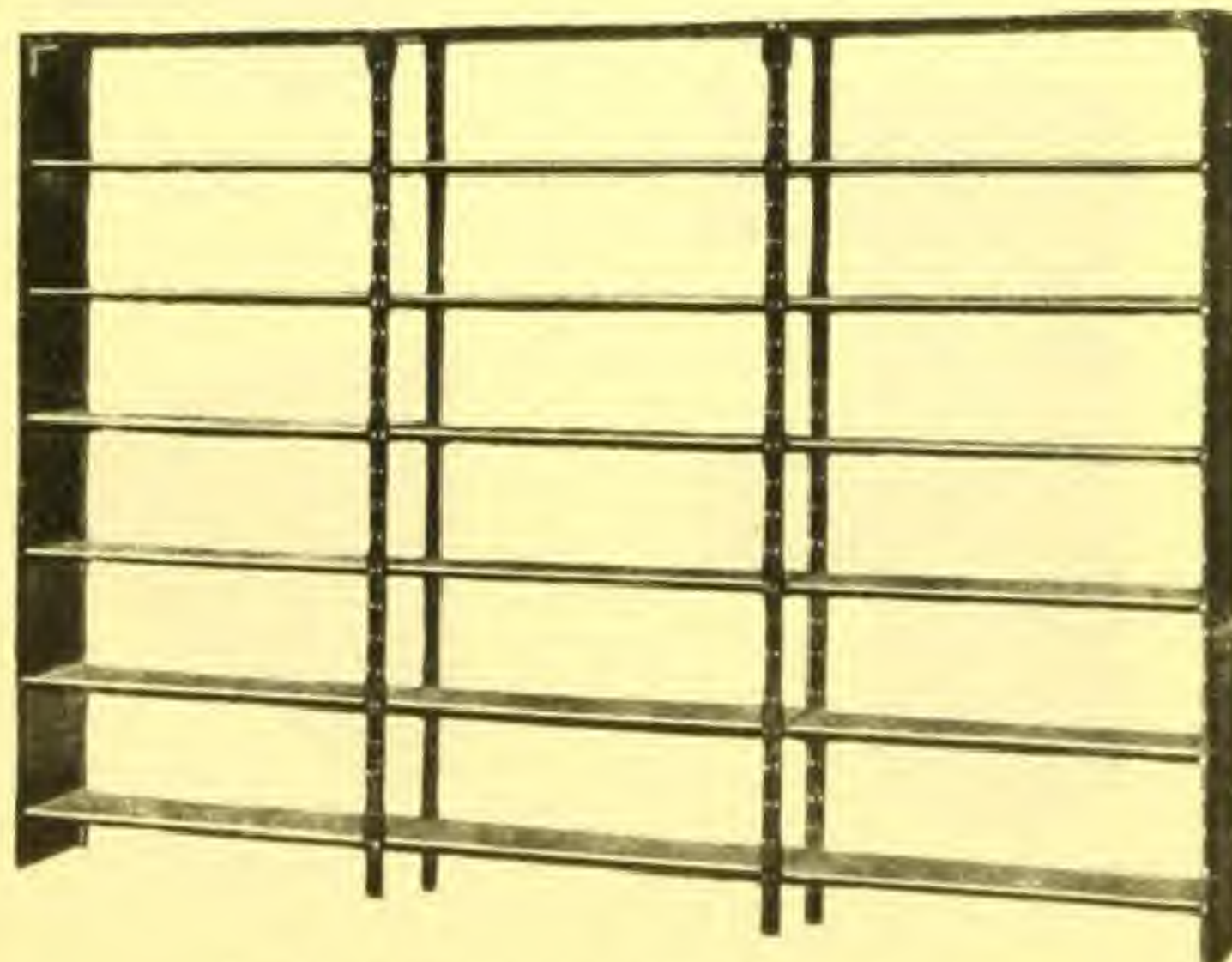
Standard "Steelbilt" Steel Shelving is available in many different forms, so that any requirement can be satisfied from stock without delay or extra expense. Every part is so made that extras can be added at will. They all fit and match up perfectly.

Skeleton shelving, shown in the centre bay in the illustration below, is the foundation of all the various combinations. To a stack of skeleton shelving can be added "solid ends," as shown, solid centres, backs, bin-fronts, dividers, label holders, groups of small drawers, counter fronts or doors.

Furthermore, extra shelves can be put in at any time when needed.

A big advantage over wood, in addition to those mentioned at the beginning, is the speed and cleanliness in making alterations.

Extras or removals can be made quickly without the noise or mess of carpentering and can be carried out while other routine work is in progress.



Standard "Steelbilt" Steel Shelving.

### Strength

"Steelbilt" Shelving is much stronger than wood for, though only comparatively light, great strength is given. On a reinforced shelf, 24 in. x 24 in., up to 650 lbs. weight has been carried, with the front flange only showing  $\frac{1}{4}$  in. deflection.

### Adjustments

"Steelbilt" Shelving adjustments enable every inch of waste space to be utilised and, because of the comparative smallness of the components, it is estimated that 33 per cent. more storage space is possible than with wood. Every shelf can be moved up or down, with 3-inch adjustments, by simply unscrewing a bolt at the two front corners and lifting off the special hook at the back.



<p>Wallpapers</p> <p>—</p> <p>Furniture</p>	<p>GRACE BROS. LTD.</p> <p>BROADWAY, SYDNEY</p> <p>NEW SOUTH WALES</p> <p>—</p> <p>WALLPAPERS — FURNITURE</p>	<p>28c</p> <p>S.A.A. File No.</p>
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[For Other Products, See Pages 305, 419, 490]

### Range of Designs

We have the widest range of Wallpapers in the Commonwealth. The best and latest designs and

styles are carefully and artistically chosen from the world's best manufacturers, England, Canada, America, Belgium, France and Germany each contributing a representative selection.

### Art Moderne

Grace Bros. Ltd. specialize in art moderne designs and colourings in Wallpapers, and the architect can find amongst our stock the exact paper to give the appropriate finish to his modern job, whether it be a restrained effect for bedrooms or a gay bizarre pattern for ballrooms, that he is seeking. The hanging of art moderne papers is becoming increasingly popular in present-day homes, as also it is in public buildings, and the use of it demonstrates the progressive spirit that the present generation professes to possess.

### Picture Panels

These picture panels are of American design, and include some fine land and sea-scapes, figures of woodland nymphs, gardens, etc. When used as a decorative medium in a suitably designed room, these panels are very effective in giving a sense of spaciousness.



Art Moderne.

### Period Papers

Architects, when studying the furnishing of a room carried out in a period design, realise the importance of having wallpaper which will help carry out his ideas of interior period design.

Grace Bros. Ltd. have a large variety of Period Wallpapers, including Tudor, Elizabethan, Jacobean, Georgian, English, Italian, and French Renaissance.

### Service to Architects

Grace Bros. are always ready to show patterns to architects and their clients. This service will be recognised as of great value to the architect in assisting his client to come to a decision regarding this important section of home designing. We will also make suggestions and give estimates for work of this nature.



Chintz.



Renaissance.



Embossed.

(Continued on next page)



## MODERN FIRESIDE CHAIRS

Nine models featuring the latest in novel extra Chairs for the lounge-room. These delightful small Chairs are covered in tapestries and velvets in bright, cheerful colourings, and provide that charming atmospheric note in your lounge-room.



No. 1.—Art Moderne Chair of small size, in dainty plain velour and rich figured seat.



No. 2.—Large size Tub Chair, in fawn velvet, with modern tapestry panel back seat.



No. 3.—Famous Fireside or Reading Chair, Richly finished, two-tone frame, with shaded fabricoid shaped back. Loose cushion seat of brilliant velvet.



No. 4.—Cinderella Chair, with lacquered frame, any colour, shaded fabricoid back and loose velvet cushion.



No. 5.—Reproduction English Tub Chair. Delightfully comfortable and covered in new tapestries.



No. 6.—The 'Gaynor' Fireside Chair, with polished oak frame and laced hide back. Deep spring seat in tapestry or velvet.



No. 7.—Art Moderne Chair of novel appearance in black velour with brilliant velvet seat.



No. 8.—Art Moderne Occasional Chair. Quaint in conception and very comfortable. Covering of fawn velvet and novel moquette seat.



No. 9.—Modern Small Chair in brown velour, with blue linen frieze velvet seat.

(Continued on next page)



## MODERN BEDROOM FURNITURE

## The Walton Bedroom Suite

A beautiful Bedroom Suite typical of our 1931 designs—all new to Sydney.

The Walton Suite, of richly figured walnut, veneered in solid Queensland maple; a perfect combination of strength and beauty.



## Displays

When selecting furniture for the home, it will be of great assistance to architects and their clients if they avail themselves of the complete furniture displays at Grace Bros. Ltd., where the furniture can be studied with respect to the interior design, and harmonious combinations decided upon.

## DINING ROOM AND HALL FURNITURE



The "Windsor" Refectory Table, of picked Oak, with cut corners and attractively fluted skirt. It is exceptionally well made and finished. Size, 5 ft. x 3 ft.



The "William" Jacobean Hall Settle, 3 ft. 9 in. long, with very convenient rug box; umbrella rail at one end. It is true to character, with new cane panel at back. Sturdily constructed and well finished.

(Continued on next page)



## KITCHEN FURNITURE

## Products

Kitchen Dressers, "Hoosier" Kitchen Cabinets, Safes, Cupboards, Kitchen Tables, Breakfast Tables, Chairs, Kitchen Stools.

## The "Hoosier" Kitchen Cabinet

The "Hoosier" Kitchen Cabinet is manufactured in America by a company which has been studying and manufacturing kitchen equipment for more than a quarter of a century. The result of this experience is that the "Hoosier" Cabinet has no equal for convenience, labour-saving and hygienic qualities.

## Construction

Only highest grade materials are used throughout the "Hoosier" Kitchen Cabinets, all members being carefully made from selected materials, and assembled under rigid control and inspection.

## Finish

The whole of the cabinet is beautifully finished in either grey or white enamel, or golden oak finish. Drawers are fitted with crystal glass knobs, with patented metal ferrules. Hinges and catches are of chromium plated solid brass. The cake and bread drawer and table top are of porcelain, and will stand years of use without chipping, cracking or otherwise deteriorating.



THE "HOOSIER" KITCHEN CABINET

Interior of top compartments white enamelled. Roll curtain, glass jar equipment, large-size lowering metal sifter flour bin, food grinder block, banded bread board, metal bread and cake drawer with sliding metal lid. Base of cupboard is equipped with sliding sanitary white enamel tray, sliding shelf and pan racks. Drawers are finished inside. Large cutlery drawer. Ant-proof casters. Dust-proof construction on all doors and drawers. Obtainable in Golden Oak, Grey Enamel and White Enamel.



KITCHEN FURNITURE has undergone many changes of late. The Oak Cabinet with its special conveniences has superseded the Dresser with its array of chinaware, especially in homes where the Kitchen and Breakfast-room are identical.



Furniture combining use and beauty are here illustrated in this complete set. If desired, pieces may be bought separately. In Grace Bros.' showroom is displayed a wonderful range of Kitchen Furniture in which colour is prominently featured.

(Continued on next page)



## CARPETS



Charm is in many things—moonlight on slumbrous seas—the glint of gold in a woman's hair—a prelude of Chopin—a grey and purple mist on Sydney Harbour.

In the rich colouring of Oriental Rugs there is also charm that endures, permanently hand-woven by artists who love their craft. Persian Rugs are as old as the imagination of man, and no authentic knowledge is available of when first they were woven.

The most pleasing effects of Oriental art have always been associated with colour; the earliest Carpets were

alive with glorious tints and the secrets of obtaining the finest shades from roots, leaves, flowers, etc., have been handed down from one generation to another.

By the weave, design and colour combinations, an expert can tell the locality in which a Persian Rug was made, although nowadays the influence of travel and conquest has made many changes, and there is no doubt that the Persian Rugs now woven are adaptations from designs made by different tribesmen for many generations.

You are invited to inspect the wonderful range of Rugs and Carpets in  
GRACE BROS.' ORIENTAL ROOM, 1st Floor, George Street West Building.

(Continued on next page.)



## MANTELS, FIRE SCREENS, ETC.

Antique Brass  
Fire Screen.Antique Brass  
Wood Box.Italian Terra Cotta Mantel  
Pallazzo Vecchio Frieze.Cretan Stone Mantel.  
Elizabethan Period.Cretan Stone Mantel.  
Tudor Period.Antique Brass  
Fire Screen.

## Mantels, Fire Screens, Etc.

The charm and psychological effect of a wood fire burning in a fireplace of neat design is recognised, and even in these days of electric, steam and hot-water heating of homes, at least the lounge or living room is not considered to be completely decorated without an open fireplace.

GRACE BROS. have a very complete stock of Mantels, Screens, Dogs, etc., of beautiful and practical design, a few of which are here illustrated.



Brass Front Wrought Fire Dogs.

Brass Front  
Wrought Fire Dogs.Cast Fire Dogs.  
Oxidised Copper,  
Finished Black,  
Oxidised Brass,  
or Nickel.

(Continued on next page)



# BRITISH, ITALIAN AND AMERICAN TERRA COTTA WARE FOR INTERIOR AND EXTERIOR DECORATION FROM GRACE BROS.

## Products

Terra Cotta Ware of every description for interior and exterior decoration, including such pieces as vases, wall fountains, urns, bird baths, window boxes, sundials, flower pots, garden benches, statuettes, etc.

## Manufacture

Terra Cotta is made by firing a mixture of potter's clay and powdered silica, usually with ochre or umber as colouring matter, though it may be made in colour or

combination of colours. The ware has a soft body, but harder and of finer quality than brick, with a dull, unglazed or glazed surface.

## Uses

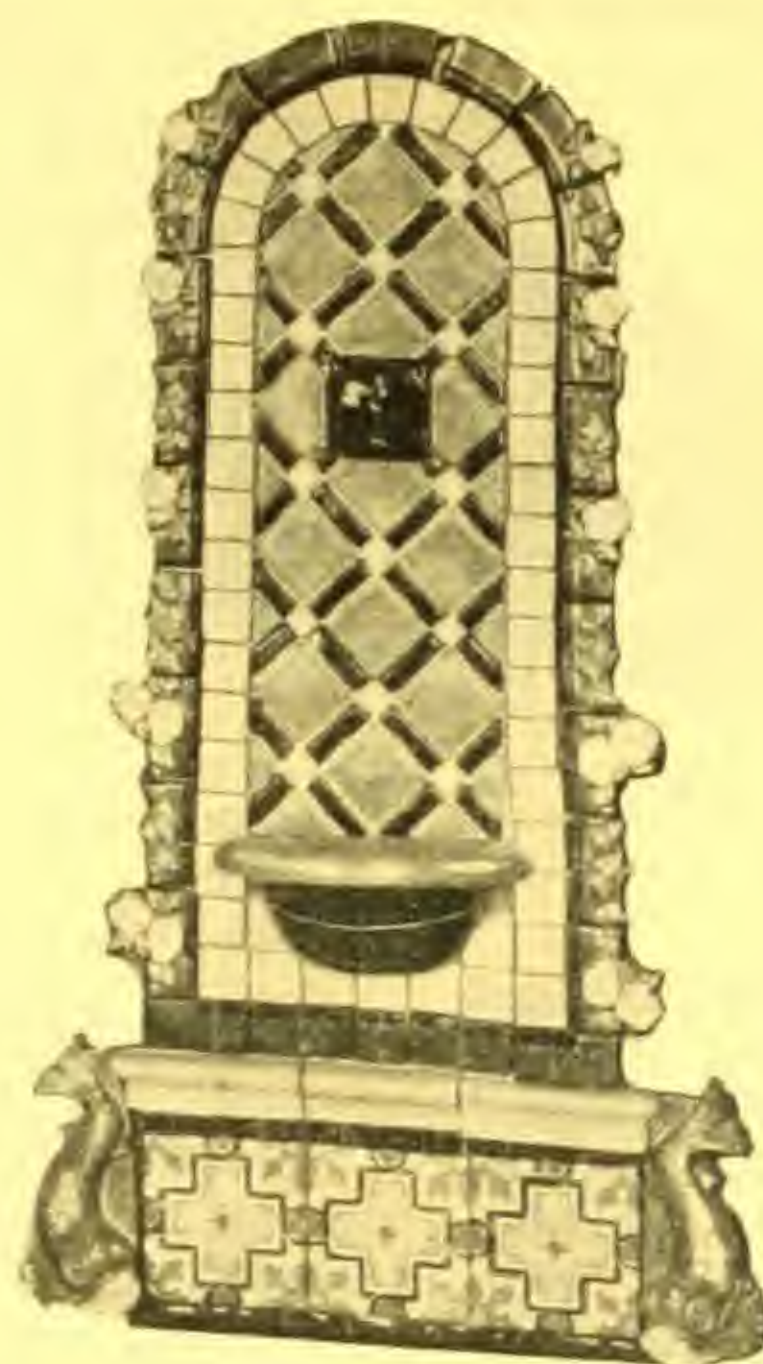
The artistic work, fine workmanship and durable quality of materials embodied in these Terra Cotta Ornaments make them an invaluable finish to the architect's job, both as concerns good quality and the display of good taste. The pottery shown on this page illustrates only a few of the many original designs and replicas from antique art which we carry in stock.



10.—Vase, Royal Doulton Ware, 15 in. high.



1.—Pompeian Vase, 12 in. high.



8.—Garden Wall Fountain, Multi-coloured, 36 in. high.  
We have a fine range of Fountains in Glazed Tiles and Aztec designs.



2.—Roman Vase, 12 in. high.



7.—Spanish Bowl, 11 in. High.



13.—Florentine Flower Box, with Pedestals, 27 in. long.

TERRA COTTA WARE,  
THIRD FLOOR, GRACE BROS.  
FURNITURE BUILDING.



14.—Grecian Bird Bath, 37 in. high.



16.—Spanish Garden Jar, 31 in. high.



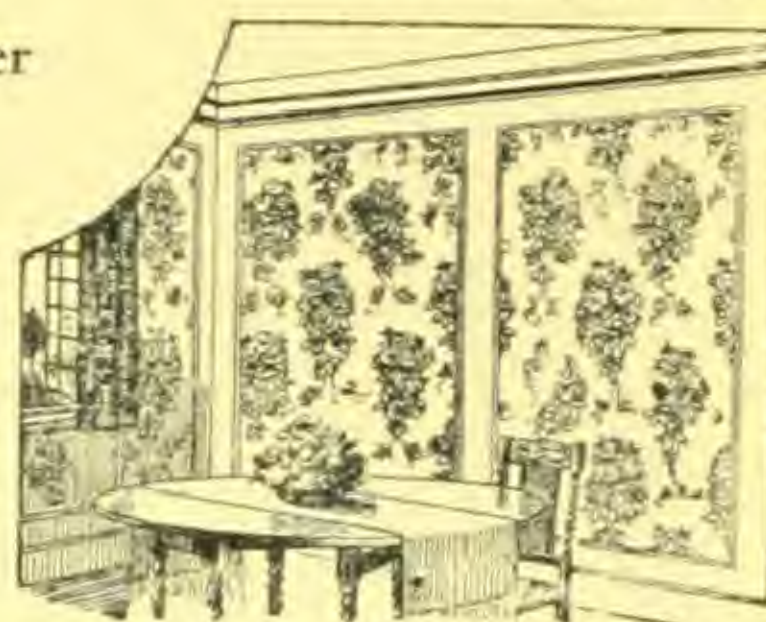
<p><b>28c</b></p> <p>S.A.A. File No.</p>	<p><b>C. MORRISON</b>  <i>Decorator, Painter and Contractor</i>  <b>284 GEORGE STREET,</b>  <b>SYDNEY</b>          Established 1881</p>	<p><b>WALL PAPERS</b></p>
	<p>GENERAL RENOVATIONS      CARPENTERING REPAIRS      BUILDING ALTERATIONS</p>	

### Company

The original firm was founded 50 years ago by the late Charles Morrison, who started in business in Sydney as a painter and decorator and afterwards took over the business of Gilkes Massey, Wallpaper Showrooms, at the corner of George and Bond Streets. Mr. H. W. Morrison is now controlling the firm.

### The Proven Superiority of Wallpaper

Throughout the years wallpaper has proved, by the constant demand made for it, its superiority to all other methods of wall treatment which rise to popularity and fall from favour again in a comparatively short space of time. Morrison's have always made a special point of selecting papers that are really good reproductions of original materials that could be used for wall decoration.



Nothing can take the place of wallpaper as a dignified and restful wall treatment.

### Effects Obtainable

Wallpaper can reproduce the most expensive and varied form of wall treatments, such as: Spanish leather, burlaps, hessians, grass cloths, crocodile and other skins, expensive tapestries in range of periods, crettons and points, furnishing materials, tiles and marble, rough plaster effects, mureen, plastic paint, silks, satins, bronze, silver and gold, panelling of oak and other woods.

Nothing can take the place of wallpaper as a dignified and restful decoration for any room. It possesses the qualification of bringing into the house an atmosphere of comfort and refinement. A great expanse of plain wall does not make a friendly or hospitable room, but there is a pleasure and charm in opening the door to a wealth of colour and design.

Wallpaper provides a charming background for pictures and furniture, and delightful designs are available to harmonise, not only with the furniture and hangings, but also to fit in exactly with the use to which each particular room is put.

Wallpaper protects plastered walls. It is also a non-conductor of heat and cold. It is an enemy to dampness, as moisture will not condense on it.



Wallpaper brings into the house an atmosphere of comfort and refinement.

Wallpaper is practically germ-proof, because it is always dry, and germs thrive only in a damp location. It is composed entirely of non-poisonous ingredients; nothing of a harmful nature enters into its manufacture.

Wallpaper is inexpensive. Even the most costly is most reasonable in price if one considers the artistic results that are obtained by its use. It is quickly hung, so that the walls of a room may be completely changed in a few hours and ready for occupancy.

Wallpaper has the power to increase the apparent size of a room and to decrease that of a room that is too lofty. By means of patterns of a vertical tendency the apparent height of a low room may be increased, while a pattern of horizontal delineation will make the ceiling of a too lofty room appear lower.

Defects in structure and in the design of a room can be greatly mitigated by the use of carefully selected wallpapers.

### Notes on Selection

In the modern wallpaper the pattern has largely deserted the wall and arranged itself in corner or pendant or upright growth. The task, therefore, of choosing a wallpaper changes. The wall itself becomes merely the background for the planned decoration.

At the same time, the selection of textures and "broken colour" patterns to form this background has so enormously increased that even here the choice is not easy, although the present taste confining itself to soft pastel shades of buffs, strong colours and greys narrows it down.

The real task comes in deciding on your accessories. Shall a simple cut-out border be used, or one with pendants? Shall a stiling be used, forming each wall into one panel with corners to add colour, or shall the wall be cut up into panels of varying size with a placed ornament in the central panel? The answers to these questions depend largely upon whether pictures are to be displayed in the rooms, and, if so, on their sizes.

(Continued on next page.)



Never was there a time when so much individuality could be shown. Instead of wallpaper stuck on by the yard there is an opportunity of making each room decorated look as if its decoration was produced for that particular room.

The richness of the colour schemes in the new cut-out friezes, and the various decorative groups and corners now produced, grows greater and greater, so that brightness and richness in our rooms is now quite easily obtained, and there is no excuse for the drab monotony of other days, even if it were possible to find amongst the new patterns.

### Colour Schemes

A room with reddish yellow walls will look smaller than, say, the same room papered in light green. The warm colours are more intrusive; the cold tend to recede. The more intense tones of a colour, the more highly saturated, in the exact terms, approach the eye and the less saturated withdraw. The lighter values of colours—the tints that contain more white—also tend to recede. To make small rooms appear larger, use light tints or small patterns; to make large rooms seem smaller and snugger, use dark colours or large patterns.

### Complementary Colours—

Red—green-blue.

Orange—blue.

Gold-yellow—blue.

Yellow—indigo.

Green-yellow—violet.

Pale green—purple.

### Practical Hints

Before papering, minute attention should be given to the preparation of the walls, which should have a smooth and slightly absorbent surface, such as is obtained by glass-papering and clairecolling. The importance of having the walls in this condition cannot be overstressed, as the success of the work depends to a great degree on the precise treatment and cleanliness observed in the preliminary work. Paste used should always be clean, fresh and of best quality obtainable.

When old walls are to be re-papered, the existing paperhangings should first be entirely removed, and the wall washed with an antiseptic.

When it is intended to hang wallpaper on painted walls, strong soda water should first be applied, and when this is dry they should be coated with strong size and whiting, and the walls underlined. This treatment prevents the paper from blistering.

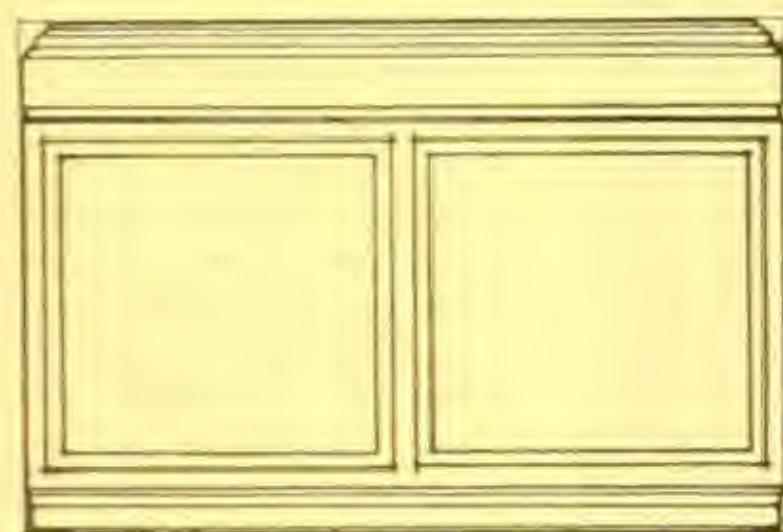
A strong coat of glue size should be applied to old ceilings before papering. The walls should be underlined for all heavy embossed or hard-backed papers.

### Cleaning Wallpapers

The best method of cleaning paperhangings is by the use of stiff dough. This must be rubbed **downwards**—on no account should the movement be directed across the paper or upwards.

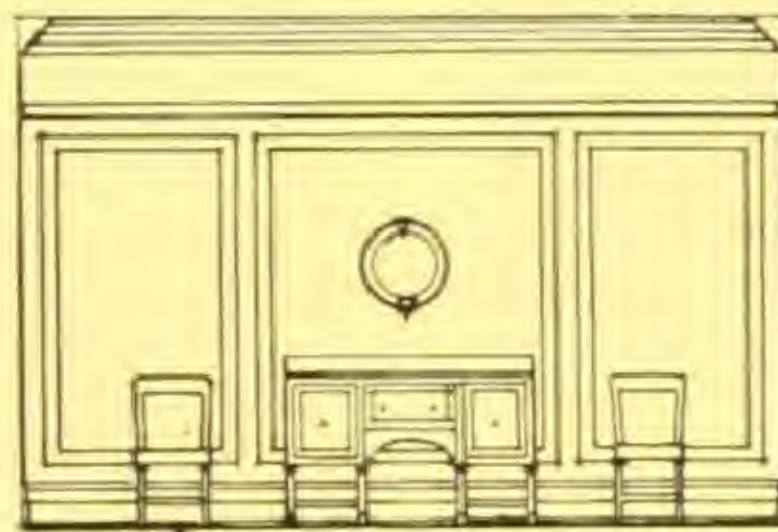
### Service and Samples

An advisory service to assist architects in the selection of wallpapers is always available, and samples will be gladly forwarded.



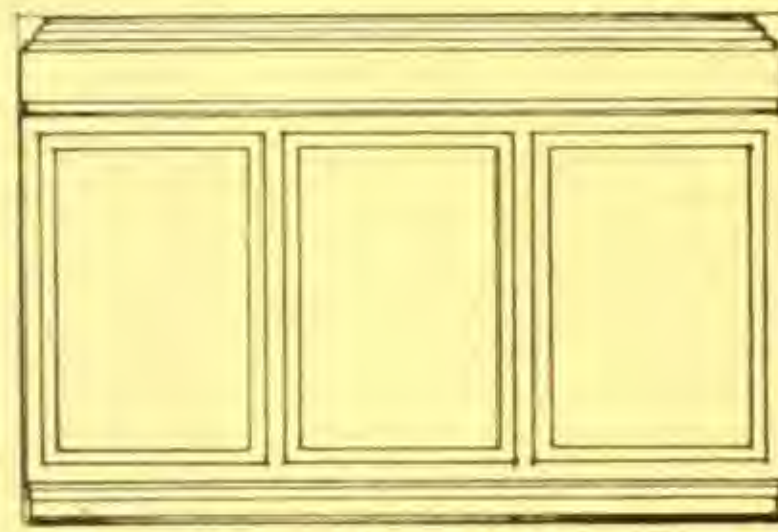
A

A single wall surface treated with two panels as in "A" is not as satisfactory as "B" or "C." In "A" the panels appear to clash or oppose each other.



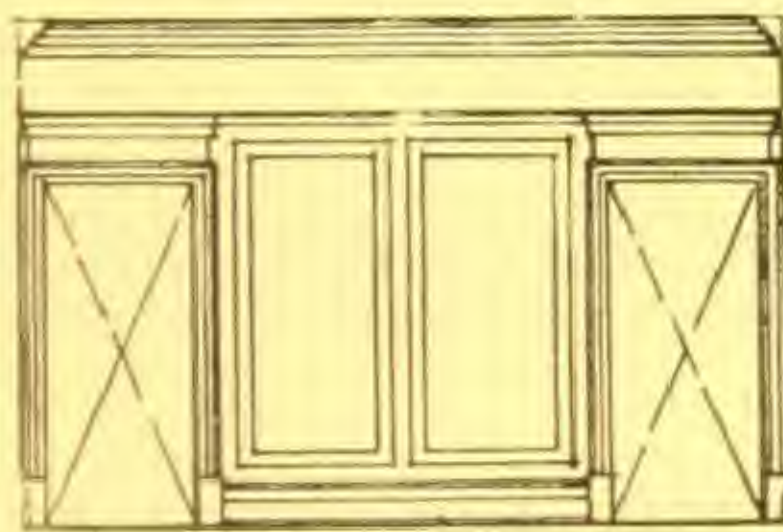
B

This arrangement is very satisfactory; it is restful in appearance and most successful where furniture forms a central feature.



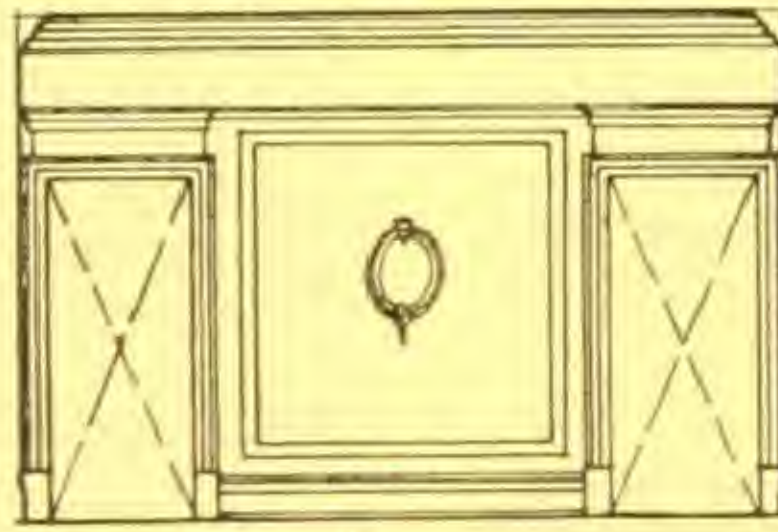
C

This arrangement of three equal panels is often employed on account of its safe and restful qualities in design.



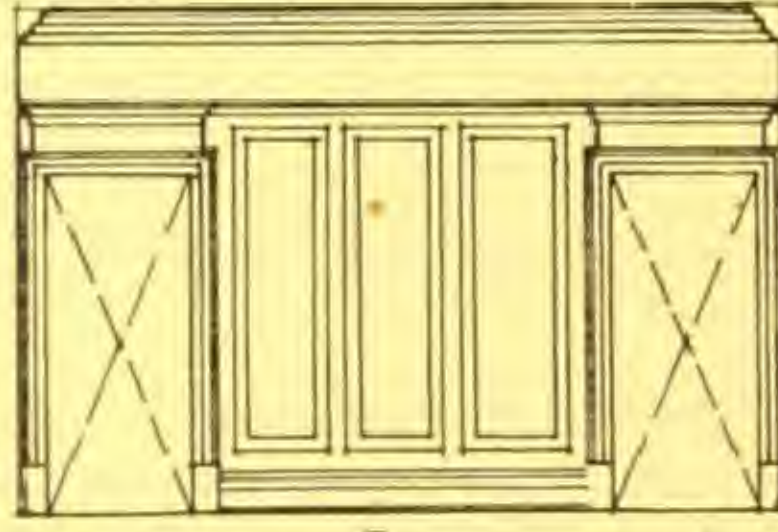
D

The two doorways and the wall space form the three main parts of the design; therefore the two centre panels do not clash as in "A."



E

A good arrangement. By a central design in the wallpaper, or an applied picture, the centre of interest can be made as shown.



F

The three centre panels are rather stilted; they would be more effective on a wider wall surface.



	<p style="text-align: center;"><b>THE WALLPAPER MANUFACTURERS LIMITED</b></p> <p style="text-align: center;">125 HIGH HOLBORN, LONDON, W.C.1</p> <p style="text-align: center;">ENGLAND</p>	
28 c		"CROWN" BRAND
S.A.A. File No.		

### Products

High-grade English-made plain and figured wall-papers, including "Lincrusta," "Anaglypta," and "Lignomur" relief decorations, washable or "sanitary" wall and ceiling coverings.

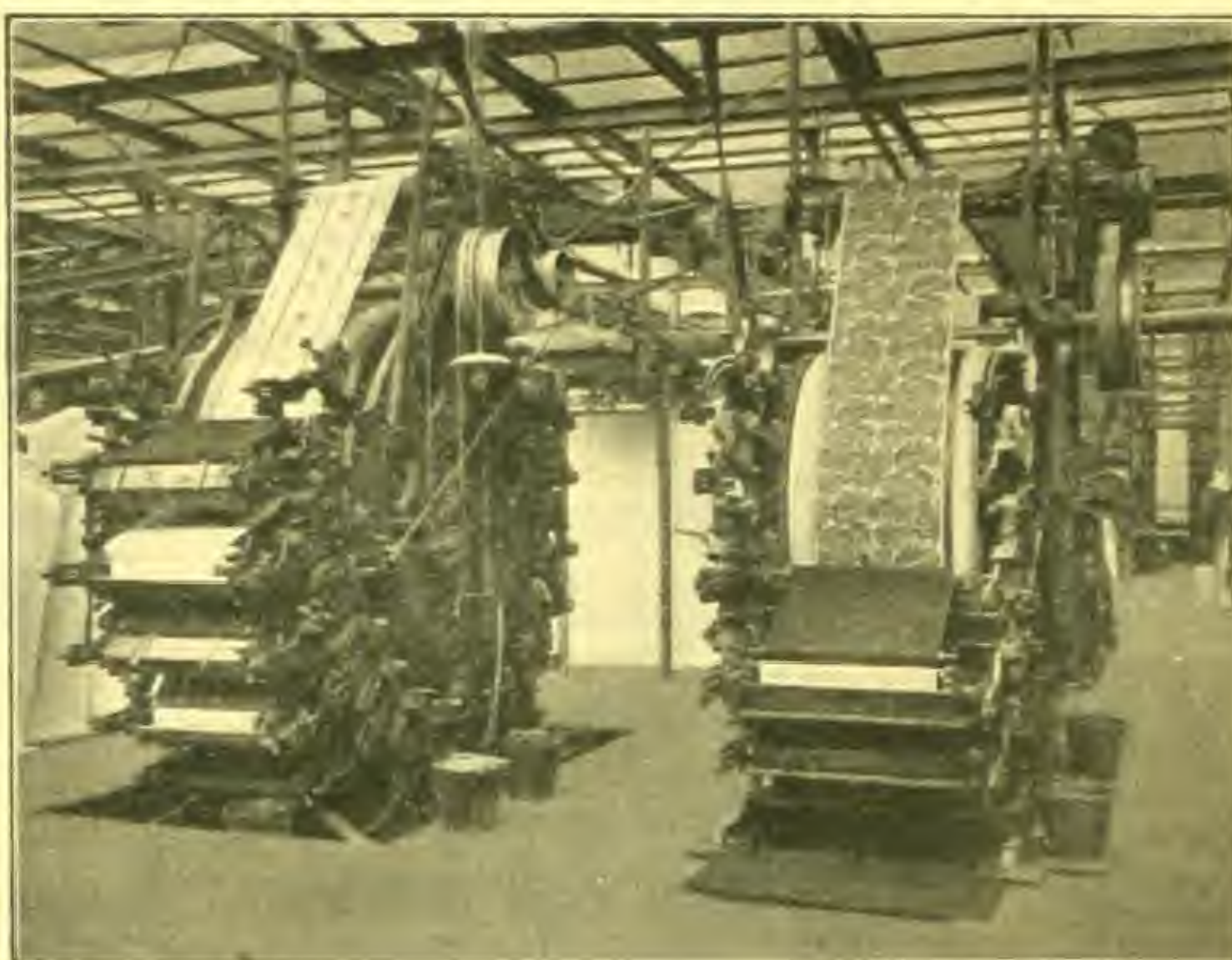
### Trade Mark

The "Crown" Brand appears on the selvage of every roll of wallpaper produced at the mills of The Wallpaper Manufacturers Ltd., of England, who are the largest manufacturers of wallpapers in the world.

The "Crown" Brand is a guarantee that you are securing papers of the best quality and designs it is possible to produce.

### Wallpaper Decoration

At the beginning of the 18th century "paper hangings" (as they were first called) were still a novelty; at first used as a passable imitation for more expensive wall coverings, they were soon recognised as good style; this change was effected through the activity and ingenuity of the English designers who successfully dealt with the designing of paper hangings by frankly accepting their mechanical nature. To-day, wallpaper is the most effective background of interior decoration, and, in its infinite variety and adaptability, can be secured to link the individual elements of any decorative scheme.



16-Colour and 12-Colour Wallpaper Printing Machines

### Value in Architectural Design

By a return to the practice of the great architects of the past, who were also the decorators of the buildings they created, the modern practitioner can create congenial environment by the medium of wallpapers through their beauty of colour, line and texture. There is available an infinite variety of papers, ranging from delicate pastel tonings, suitable for the restful bedroom treatment, to the bright jazz effects so appropriate for the dance room.

### The Printing of Wallpaper

There are two methods used in the printing of wallpaper—(1) Block printing, which has been used since the commencement of the industry; and (2) printing by machinery. Block printing, or hand printing, is limited to the using of one colour at a time, and is therefore superseded by machinery.

There are three types of machine-printed wallpapers—(1) Pulp, where the pattern is printed in water-colour direct on to the pulp; (2) grounds, where a coating of colour is applied before the pattern is printed

thereon in water colour; and (3) sanitary papers, which are printed in oil colour.

In the coating of grounds the surface is roughly covered with colour by a felt roller. This is evenly distributed by brushes, and an automatic carrier takes it to the drying-room, where it is rolled into reels ready for the printing machine. It is worth noting here that no arsenic or other poisons are used in the manufacture of wallpapers.

The printing is done from rollers, pulps and grounds being printed on a machine, using wooden rollers on which the pattern projects, the circumference of the rollers being made the exact measurement of the repeat of the pattern. The printing surface of the roller is of

felt outlined with fine metal which has been punched into the wooden base. On the water-colour machine each roller prints in one colour; naturally great exactitude must be observed, as some of the water-colour machines take up to 20 rollers in the printing of a design.

The machine—illustrated on this page—consists of a large drum around which the rollers are arranged. During one complete revolution of the drum the paper receives the impression from the rollers, which are supplied with colour from an endless belt of felt, revolving in contact with another roller, partly immersed in colour.

When the design is complete, the paper passes over the top of the drum. With the colours still wet, it is automatically picked up by cross-sticks and carried in hanging folds on a moving chain, through the drying chamber. Here heated air absorbs all moisture, and it passes on to be rolled into pieces and numbered.

Sanitary papers are printed on a machine using a copper-engraved roller, and prepared similar to the plates used in colour-printing. This machine has four rollers, three printing the primary colours, and the fourth black.

### Embossed Papers

The process of forming embossed papers, now so extensively used, is carried out by the use of two rollers, one with the pattern raised and the other having it sunk; between these the paper is pressed.

The texture of fabrics of all descriptions, as well as of other materials, have been added to wallpapers by embossing. At the present time it is also used not merely in imitative fashion, but to produce a surface on which light and shade give a sense of atmosphere.

(Continued on next page)



## ADVANTAGES OF "CROWN" WALLPAPER

**DECORATIVE.**—Walls are inevitably a factor in the decorative scheme of every room. Wall treatment, therefore, should be in harmony of texture, colour and design with the carpet, curtains, furniture coverings, etc., in a room. If this harmony does not exist, successful decoration is impossible, as the walls stand out in "isolation" from the rest of the scheme. One point of particular importance that should be recognised is that a correct treatment of the ceiling and upper part of the wall is essential. The walls and ceilings constitute one unit in the room and there must be a relationship; this can be simply effected by the use of wall and ceiling coverings.

**MODERN.**—Patterned walls as provided by means of wallpapers are in keeping with the vigorous spirit of the age. Through the extensive use of geometric designs, the new wallpapers and borders emphasise simplicity by the elimination of unnecessary details, good proportions and correct colour harmony being prominent, the keynote of modern art.

**PROGRESSIVE.**—The staff of expert artists of the wallpaper manufacturers create and reflect the best new thought in interior decoration.

**ADAPTABLE.**—Wallpaper is capable of any number of interpretations, suitable to any room, to any temperament, and to any purse. By a judicious choice of wallpapers, attention can be diverted, or the apparent size or height of a room altered.

**DURABLE.**—Wallpaper protects plastered walls, and shows wear less than any other wall covering.

**EFFICIENT.**—Paperhanging involves less trouble than any other wall decoration.

**ECONOMICAL.**—Wallpaper embodies the art of the leading colourists and designers at a minimum cost. It gives greater value for the money expended than any other item of furnishing.

**HYGIENIC.**—Wallpaper is practically germ-proof because it is always dry, and germs only thrive in a damp location. In addition, a great quantity of "Crown" wallpapers are made washable; both plain and varnished papers can be wiped with a damp cloth.

**TRANSFORMING POWER.**—The elimination of what is termed "hospital atmosphere" has been effected by the doctors of a large and well-equipped hospital in America by having the walls of wards and private patients' rooms papered.

The barn-like effect of hotel lobbies and the cheerlessness of bedrooms may be avoided by a judicious use of wallpapers.

Wallpapers can create emotional effects, for every colour has its own message; yellow, for instance, introduces quality of cheer, buoyancy and life. Red suggests warmth and excitement, while blue conveys sensations of coolness, repose and restraint.

**EASILY CHANGED.**—Changes in fashion are inevitable. The removal of wallpaper is simple and inexpensive, whilst the removal of paint or plastic material is a dirty and expensive process.

**SATISFACTORY.**—The finished effect can be easily anticipated. Wallpaper patterns and pieces are displayed in all leading warehouses, where the advice and service of the staffs can be confidently relied on in the selection of the most suitable papers.

INSIST ON "CROWN" BRAND BRITISH WALLPAPERS AND DEVELOP  
EMPIRE TRADE

## SPECIFICATION FOR PAPERHANGING

## MATERIALS

All paste for paperhanging shall be fresh and of best quality.

All papers shall be "Crown" brand English wallpapers selected by the Architect.

## WORKMANSHIP

Papers shall be hung true to pattern and be well dressed into all angles. Carefully mitre all borders in panelling so as to avoid mutilation of the pattern. Centre all prominent patterns at the chimney breast and corners of the room. Any paper showing air-blisters or other defects shall be stripped and re-papered.

## SCHEDULE

Note.—If walls have been newly plastered in lime mortar, they should be treated to neutralize the action of the active lime in the plaster.

Walls finished in gypsum or "Hardwall" plaster may be papered soon after drying out.

In all cases it is advisable that both walls and ceilings should be sized before hanging papers.

Set out in Schedule (1) the apartment, (2) wallpaper at a P.C. amount of ..... per roll or piece and (3) frieze at a P.C. amount of ..... per yard.

25d

S.A.A. File No.

G. QUENTIN SUTTON

MURAL ARTIST

407 AUBURN ROAD, AUBURN, VICTORIA

MURAL  
DECORATION

To the architect who proposes using large decorative paintings or mural panels in a public building or private mansion, there are a few necessary points of interest with which he should be acquainted. The most vital thing to realise is the distinct and specialised field of mural painting as apart from "studio" or "easel painting," which is done purely with the idea of getting reality and satisfying the tastes of the general buying public. It is surprising how few artists realise this fundamental point in mural design. A mural panel, while perhaps including life-size figures, animals or scenic background, must be so painted in order to effect a compromise between the introduction of a certain amount of delicate light and shade, with the flatness of pure decorative art. When an architect designs a large hall, for instance, he gets his effect of balance by the relationship of large wall surfaces to the other lines, columns, windows, doors, etc., which have been introduced. These wall surfaces must not be broken up by large murals which, instead of appearing as a part of the wall, give such a realistic effect as to make the onlooker feel that the figures or animals are almost alive or that one could walk straight through the panel to the distant mountains, etc. In short, the mural artist must not "knock a hole" in the architect's wall by the stereoscopic painting which he would employ on a large studio or easel picture. So soon as the architect can understand this vital essential of mural design and get in touch with a decorative artist who is also acquainted with it, then the objective of a panel or panels which will successfully fall into the architect's decorative scheme is more than half accomplished.

Mural paintings are not meant to dominate the room in which they occupy, but to decorate and take their place in the ensemble of the architect's design.

This type of work can be divided roughly into two methods. There is the method of fresco, which necessitates painting direct on to the plaster while it is still green, and is rather little known in Australia. It also involves the subject of suitability and permanence of plaster or wall surface and the various secrets—so called—and methods of different artists in the selection and mixtures of colours—either oil or distemper.

The second, more reliable and simpler method is to allow the artist to work on a canvas (using a "matt" or "egg-shell" finish), which can be stretched on a frame specially made to be set into the wall so that the design eventually appears as a part of it. Failing the suitability of this, the canvas can be stretched on a thin frame and screwed direct on to the wall with a simply but suitable mould around its edges. This last method was successfully used on two great panels, twenty-five feet long, painted by Mr. Quentin Sutton for the Regent Theatre, Melbourne, and it has been often insisted that they were done direct on to the wall surface.

Representative mural designs in Australia may be seen at the Melbourne Town Hall, Public Library (Staircase), Menzies' Hotel (Bar), T. & G. Building (Entrance Foyer), Regent Theatre (Mezzanine Foyer), Melbourne, Rotunda of the State Theatre, Sydney, Grant Entrance Lobby of the Regent Theatre, Brisbane, and at the Regent Theatre, Adelaide.



<div>28c</div> <div>S.A.A. File No.</div>	<div>H. H. GROTH &amp; Co.</div> <div><i>Wallpaper Specialists</i></div> <div>51 YORK STREET, WYNARD SQUARE, SYDNEY</div> <div>Phone: B 3690</div> <div>Queensland Representative: J. A. C. KINGSFORD GRIFFITHS HOUSE, QUEEN STREET, BRISBANE</div>	<div>WALLPAPER</div> <div>B.A.L.M. PRODUCTS LEAD PAINTS ENAMELS "DUCO"</div> <div>OILS AND BRUSHWARE</div>

### History

The firm of H. H. Groth & Co. was founded originally in 1852, so ranks as one of the oldest in Australia in their line. Groth's were oil and colour, glass and wallpaper merchants, etc., until 1926, when the firm was reconstructed, becoming wallpaper specialists only—the partners of the firm being the late Mr. L. M. Moss and Mr. H. K. Hey.

### Products

Groth's have all classes of papers; their range being most varied. They recognise that whilst it is necessary to have an extensive selection of exclusive and expensive goods, yet it is also advisable to have a large range of inexpensive lines for the client who requires moderate priced goods—but these cheaper lines are selected carefully in artistic effects that will not detract from the name of Groth as an exclusive wallpaper house.

### Stocks

Wallpapers are not manufactured in Australia, and Groth's stocks are culled from the best mills throughout the world—90 per cent. from England, from such exclusive mills as Sanderson's, Shand Kydd, John Line, Heffer Scott, and many other mills producing high-grade wallpapers. It is also necessary to obtain a small proportion from the Continent, the United States and Canada, to complete the selection, and these countries provide the remaining 10 per cent. of Groth's imports.

### Quality

Groth's claim to be a household name for wallpapers, and their

aim is to be stamped as a house for quality with reasonable prices and a house that can unhesitatingly be recommended by an architect to his clients.

### Showrooms

The showrooms in Wynyard Square are very easy of access and there is that absolute wallpaper atmosphere about the place which is only achieved by a firm that concentrates on wallpaper as its main line.

The walls are panelled out with various schemes showing what beautiful effects can be obtained by modern wallpapers and, in addition, there are screens showing hundreds of room effects, which help considerably to display to a client the ultimate effect in the home.

### Special Service to Architects

The modern architect is a busy man. Much of his time must be devoted to supervision of structures in course of erection, and we realise that, at times, he would be glad of relief from the necessity of spending a considerable time in the selection of wallpapers. In this connection we can offer the assistance of a trained and experienced staff who, working under the architect's general directions as to treatment, would prepare and submit a scheme for his approval.

With our knowledge of stocks and of the effects produced by various combinations, we can usually save an appreciable amount of time, and we place no limit on this service, being willing to undertake anything that is within our province.



An elegant treatment expressing dignity, restfulness and charm.



## SPECIAL TREATMENTS

Modern wallpaper design is so comprehensive that we would suggest that suitable subjects for the decoration of theatres and public halls could be selected from our stocks. It might be found that this form of decoration, while adding richness and colour to the building, is really more economical than

any other and renovations embodying a complete change of design and colour can be executed with little disturbance to the normal operations of the institution. Some of our flock papers, which are well-designed and perfectly executed, would find their correct setting in a large building of this type.

## Wallpaper in Offices

It is an accepted fact that congenial surroundings improve the quality and increase the quantity of work performed by mankind and if this rule is applied to those who work in offices the logical deduction would seem to be that the best that is possible is not being produced in all cases because of the uninteresting rooms in which the work is done. Many architects have their own offices papered in a manner both dignified and artistic, and while this adds to their own comfort, it also makes a good impression upon their clients and other callers; there are also other professional and commercial offices treated in a similar manner, but there remain thousands of other offices which are either drab and cheerless or white and glaring to the point of painfulness.

We would suggest to the profession that in planning new buildings or reconstructions, this aspect of wall finish might be considered and provision made for the use of wallpaper. It is now possible to obtain a large range of patterns sufficiently restrained in treatment to suit the most conservative taste, which are also serviceable and pleasant to look upon.

## Points to Remember

The manufacture of wallpaper is a vigorous and progressive business and entirely new productions, differing not only in design but in fabric, are placed on the market at frequent intervals. We are assured by the

manufacturers that every new production is subjected to a severe practical test before it is offered for sale and they are convinced that any goods they place upon the market can be hung satisfactorily under suitable conditions. It is imperative, however, that the paper-hanger is a craftsman and, moreover, one who has brains and imagination in addition to clever fingers, for occasions may, and do arise when orthodox methods have to be abandoned and new ways discovered of handling new goods. Such a man is worthy of consideration and sympathy in an exacting job, and while it is perhaps natural, as he is usually the last tradesman on the job, for the owner to be anxious for him to be gone, it is merely stating a fact to say that work of this nature, if unduly hurried, must suffer. This does not imply that the slower worker is necessarily the better man, but is rather a reminder that undue haste results in less speed.



A Dainty Bedroom Paper of the Mid-Victorian Type.

(Continued on next page)



### Hanging Paper Over Wood

This can only be done satisfactorily by covering the surface with scrim and hanging the paper upon that. The scrim is 72 inches wide and is made in several weights, and should be scoured in order to prevent any possibility of stains from the jute of which it is made. It is tacked to the surface at the edges only (so that any movement of the boards does not affect it materially) and tape should be used to prevent the heads of the tacks pulling through the scrim. The tacks must be tinned, or rust will occur and discolour the paper. Two coats of size applied in a jellied condition will tighten the scrim considerably and when a lining paper has been hung over it the surface should be fit to receive any wallpaper decoration.

### Linings

Whenever wallpaper is used a lining is desirable, but in some cases it is essential. The essential cases are those where a heavy or stiff paper is selected, and in the case of renovations where the plaster is soft or

sandy. We have met with cases of heavy papers coming away from the plaster and even bringing the setting with them, but in almost all these cases no lining had been used. The lining should be hung transversely along the wall and allowed to dry thoroughly before the filling is hung. A lining also equalises the absorption of paste and prevents the blistering which will sometimes occur when inequalities in the density of the plaster expedite or retard the drying of the paper in patches.

### Waterproof Papers

A paper coated with pitch and offering some resistance to dampness from within the wall may be of use when the dampness is only slight and temporary and when it is desirable to proceed with papering rather than incur delay while the wall dries.

There are other papers varnished or suitable for varnishing after hanging, which are impervious to water and can be used in bathrooms as an alternative to tiles or in any other situation requiring a waterproof surface.

**A TABLE TO CALCULATE THE NUMBER OF PIECES OF ENGLISH WALLPAPER REQUIRED FOR ANY ROOM**

Height in Feet from Skirting to Cornice or Picture Moulding.	The top line is the measurement round the walls in feet, including doors, windows, etc.																		
	28	32	36	40	44	48	52	56	60	64	68	72	76	80	84	88	92	96	100
7 and under 7½	4	4	5	5	6	6	7	7	8	8	9	9	10	10	11	11	11	12	12
7½ .. .. 8	4	4	5	5	6	6	7	8	8	9	9	10	10	11	11	12	12	13	13
8 .. .. 8½	4	5	5	6	6	7	7	8	8	9	9	10	10	11	12	13	13	13	14
8½ .. .. 9	4	5	5	6	6	7	8	8	9	9	10	11	11	12	12	13	13	14	14
9 .. .. 9½	4	5	6	6	7	7	8	9	9	10	10	11	12	12	13	13	14	15	15
9½ .. .. 10	5	5	6	7	7	8	9	9	10	10	11	12	12	13	14	14	15	15	16
10 .. .. 10½	5	5	6	7	8	8	9	10	10	11	12	12	13	14	14	15	16	16	17
10½ .. .. 11	5	6	7	7	8	9	9	10	11	11	12	13	13	14	15	16	16	17	18
11 .. .. 11½	5	6	7	8	8	9	10	10	11	12	13	13	14	15	16	16	17	18	18

### REVIVAL OF PAINT DEPARTMENT

To meet the convenience of many clients who prefer to buy their wallpapers and paints from the same house, we have lately added paints and varnish to our stock.

We realise the importance of selecting a brand that we could recommend with confidence, and inquiries in many directions convinced us that B.A.L.M. products have no superior. We have therefore adopted as our leading lines, B.A.L.M. lead, prepared paints, B.A.L.M.

high-grade enamel for general work and high-speed enamel for use on hurried jobs, B.A.L.M. varnishes for all purposes, B.A.L.M. stainers ground in oil, roof and bridge paint, "Durakote" (a cold water paint of great merit, having great covering power, extreme whiteness, and a degree of adherence often lacking in similar preparations), Brushing "Duco" and Spraying "Duco," and "Zenith" kalsomine.



## DUNLOP PERDRIAU RUBBER CO. LTD.

Manufacturers of Rubber Flooring, and every description of Rubber Goods.

MELBOURNE: 108 Flinders Street.  
Phone: Central 10740 (14 lines)

SYDNEY: 27 Wentworth Avenue.  
Phone: M 2901 (15 lines)

BRISBANE: Centenary Place.  
Phone: B 1641

LAUNCESTON: 93 York Street. Phone: 1850

ADELAIDE: 103 Flinders Street.  
Phone: Central 8050

PERTH: 424 Murray Street.  
Phone: B 8181

HOBART: 35 Argyle Street.  
Phone: 3989

DUNLOP  
PERDRIAU

28i

S.A.A. File No.

### Products

Dunlop Perdriau Rubber Flooring—manufactured in tile or sheet formation, and in standard designs and colour combinations.

### Tiling and Flooring

Rubber is the most modern material for covering floors and possesses a combination of qualities which is found in no other type of floor covering. It not only has properties in which competitive materials are deficient, but has many of those for which they are noted. Its advantages are sufficiently evident to have already attracted the majority of architects, and its daily increasing use is rapidly proving its paramount importance to the building trade.

Dunlop Perdriau, in addition to offering the very highest grade rubber tiling and flooring, are in a position to give a complete and efficient service in connection with its use. Anyone requiring information on any phase of rubber floors is invited to apply to Dunlop Perdriau Rubber Co. Ltd., and those who order these materials can rely on the experience of our experts in every detail, from the preliminary design suggestion to the finished laying.

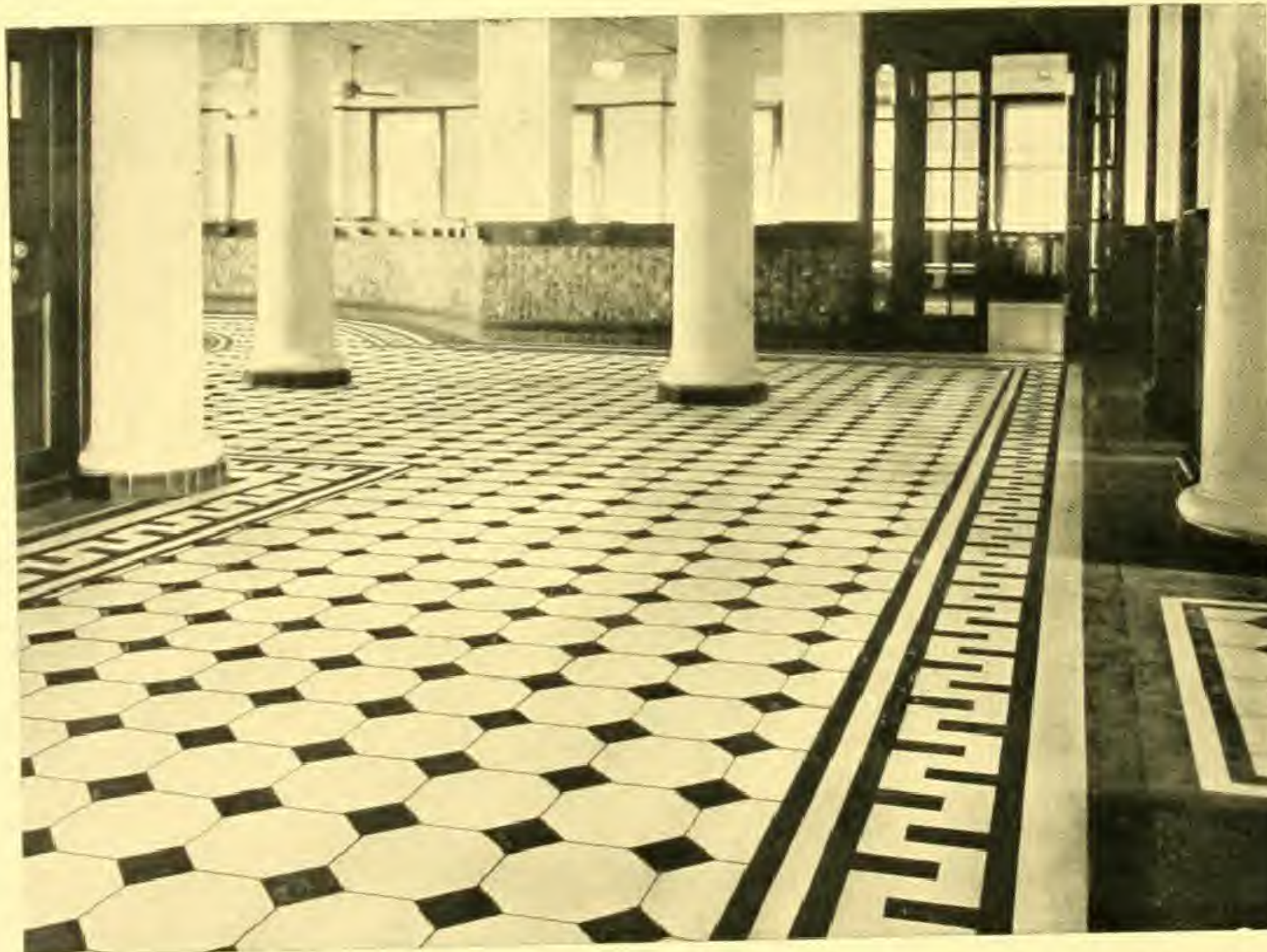
### Rubber Floors—Their Value to the Modern Building

By long experience and intensive research, Dunlop Perdriau Rubber Co. Ltd. are able to supply flooring materials unrivalled for quality and durability, and the floors which now bear their name stand supreme in all main qualities.

The characteristics which make Dunlop Perdriau floors of such value to modern building can be classed under ten headings:

1. Almost everlasting.
2. Easily cleaned.
3. Silent and have non-slip tread.
4. Waterproof.
5. Fire resisting.
6. Hygienic and sanitary.
7. Materially improve acoustic properties.
8. Shock absorbing.
9. Adaptable to colour and design.
10. Non-conductor of electricity.

Dunlop Perdriau floors represent the truest economy, for although their original cost is slightly higher than some types of floors, the almost everlasting life they enjoy far outweighs the difference in first cost.



Section of  
Flooring,  
Broken Hill  
Proprietary  
Co. Ltd.  
(N.S.W.)

No. 3  
Design in  
Dunlop-  
Perdriau  
Matting  
Brochure

### Rubber Floors—Their Uses

The unique combination of qualities of Dunlop Perdriau rubber floors renders them suitable for almost every class of building. They are especially appreciated in situations where hygiene is the first essential, where heavy wear is experienced, where silence is desirable, or where easily-cleaned waterproof flooring is necessary.

### Sanitary and Odorless

Its non-absorbent, smooth texture surface afford no lodgment to disease germs or odors. The slight characteristic rubber odor soon disappears.

In addition to ensuring such exceptional durability, Dunlop Perdriau floors offer the comfort and silence of carpeted floors, not only at a lower price, but also with the important advantage of requiring only soap and water to keep them hygienically clean.

The increasing attention which is being paid to the psychological effects of colour in decoration is provided for by the wide range of colours and styles in which Dunlop Perdriau floors can be obtained, and by the design service which Dunlop Perdriau offer. A qualified staff, with experience in all types of decorative work, is engaged to submit designs and colour schemes suitable for any class of building.

(Continued on next page)





No. 126



No. 120



No. 119



No. 118



No. 128



No. 121



No. 122



No. 123



No. 124



No. 125



No. 127



No. 117



No. 100



No. 106



No. 107

## COLOUR CHART—DUNLOP PERDRIAU RUBBER MATTING

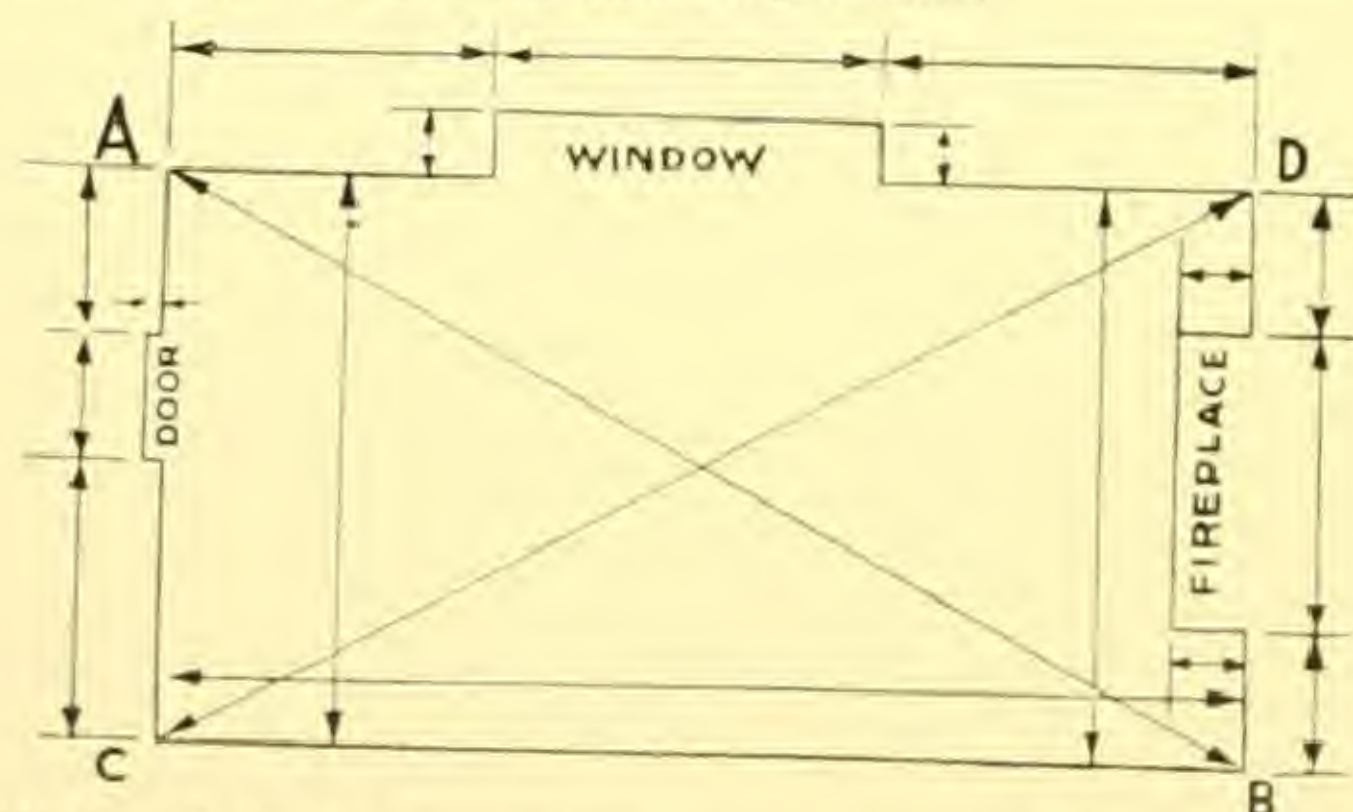
Whilst the colours depicted in this Colour Chart and the one on the following page are reasonably close to the finished colour effects obtained in Dunlop Perdriau Rubber Matting, the Company does not hold itself responsible for any slight divergences in colour of Matting as compared with colours illustrated.

## Thickness and Inlays

Dunlop Perdriau matting is obtainable in plain or variegated in the following thicknesses:  $\frac{1}{8}$  in.,  $\frac{3}{16}$  in., and  $\frac{1}{4}$  in. Inlaid matting in thicknesses of  $\frac{3}{16}$  in. and  $\frac{1}{4}$  in. The design of inlaid matting is not a surface one, but is inset right through, thus ensuring permanency of pattern.

## Necessary Measurements

When enquiring for or ordering Dunlop Perdriau rubber flooring, please give the following details:—



(1) Give fullest details of dimensions, as shown on the above sketch and, if possible, send scale plan of the area to be covered.

- (2) If the skirting board is not straight, make a special note of the fact.
- (3) Full details of the measurements of diagonals are essential if the room is not square. (See A-B and C-D above.)
- (4) Where curves exist send a template or state radius of the curve.
- (5) State thickness of rubber required.
- (6) Give details of general colour scheme of walls, ceilings, etc. State the purpose for which the room is used—office, show-room, residential, etc., and, if you think it necessary, state style of furniture in use.
- (7) After perusing designs, borders, etc., in Dunlop Perdriau Illustrated Matting Brochure, give details of the type of design and borders you prefer.
- (8) If a square tiling design is preferred, calculate size of squares recommended to see that they fit in exactly with centre area and border.
- (9) State type of floor on which it is proposed to lay the rubber, and say whether there are any irregularities which are likely to penetrate the rubber or cause unevenness after laying.

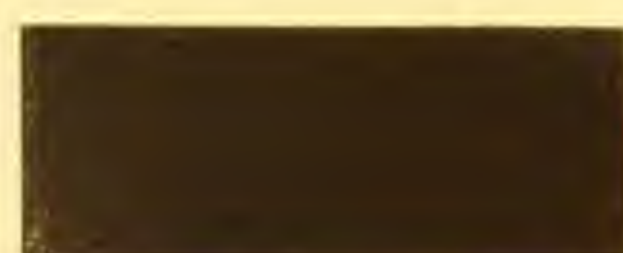
## Laying of Dunlop Perdriau Rubber Floors

The satisfactory service of a rubber floor depends very largely on correct laying, and in view of this we recommend that all Dunlop Perdriau floors shall be laid by our own experts. Out of pocket expenses only are charged for laying. This procedure, in addition to ensuring the best work, enables Dunlop Perdriau to operate their complete service.

In new buildings, where it is intended to lay rubber matting, it is suggested that Dunlop Perdriau be consulted regarding composition of sub-floor, as frequently expensive sub-floors are unnecessarily installed. Where the use of rubber flooring is decided upon, it is often possible to effect considerable saving by the preparation of a cheaper sub-floor.

(Continued on next page)





No. 116



No. 115



No. 114



No. 113



No. 111



No. 112



No. 108



No. 109



No. 129



No. 102



No. 103



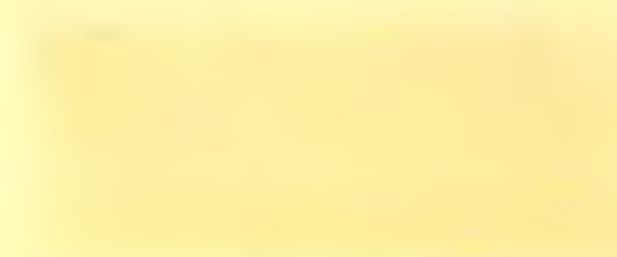
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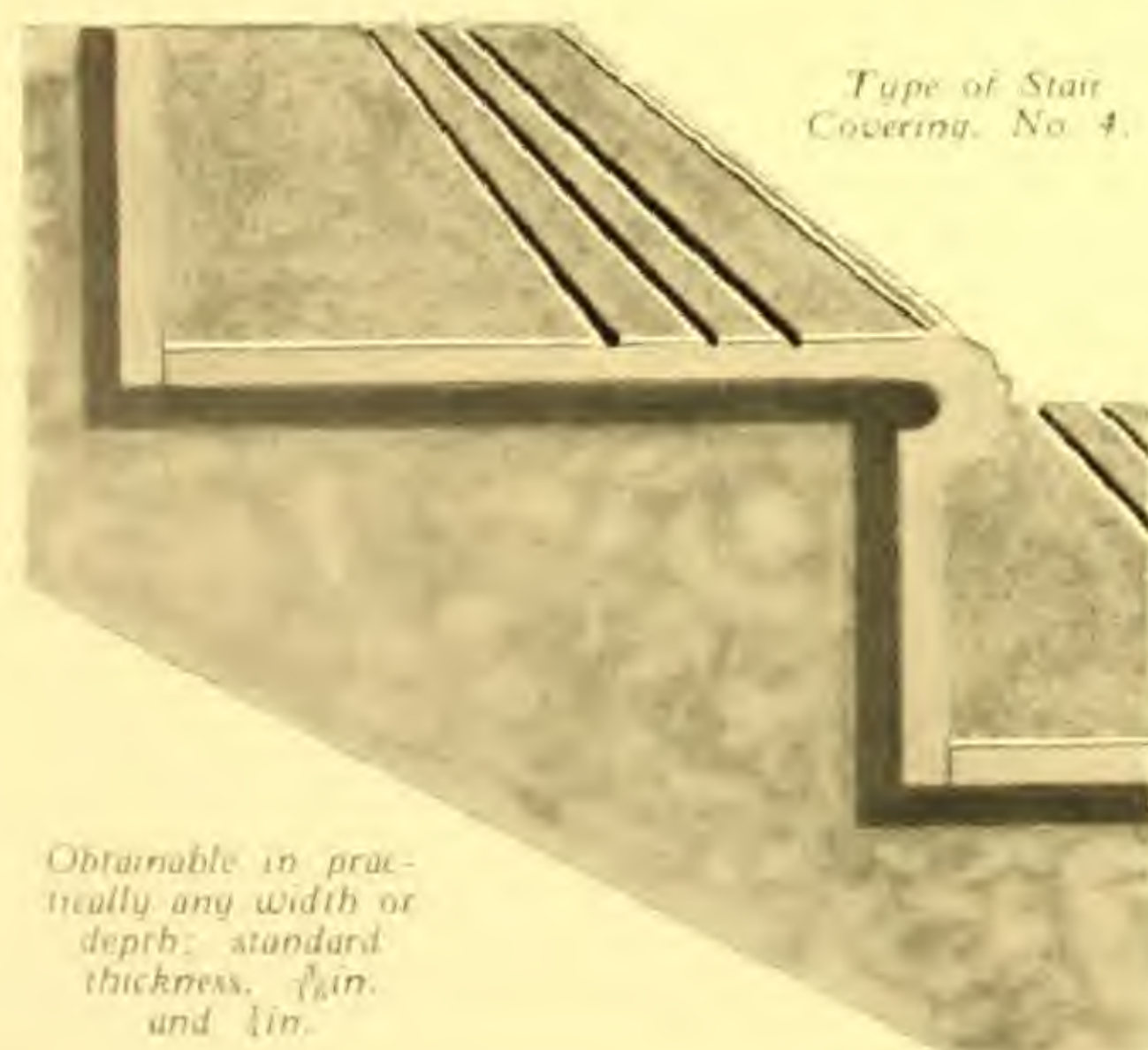
No. 110



No. 101

## Stair Treads

Dunlop Perdriau specialises in a variety of rubber stair treads—suitable for practically any type of stairway—which afford exceptional advantages. They provided perfect security to the tread, and lessen the noise of the building. Their wearing qualities are unequalled, and are especially suited to withstand the uneven wear experienced on stairs. In the event of one stair becoming worn in part, replacement can be made without affecting the whole length of the stairway.



Type of Stair  
Covering, No. 4.

If rubber is fitted to a new staircase, the treads of which can be made of inexpensive wood or concrete, the bases of the stairs can never be worn.

## 4 Different Types of Stair Coverings

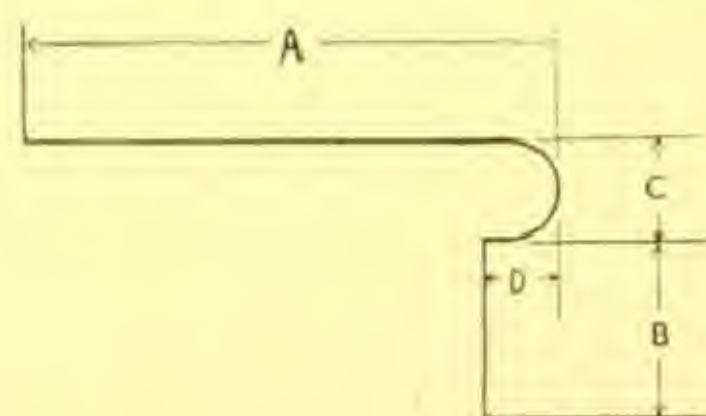
Dunlop Perdriau stair treads are available in all colours and of the 4 following types:—

1. Stair tread and nosing in one piece.
2. Stair tread only (standard thickness  $\frac{3}{8}$  in. and  $\frac{1}{4}$  in.).
3. Inset tread fitted in prepared wells on stairway. Thickness,  $\frac{1}{8}$  in. to  $\frac{3}{4}$  in.
4. Stair tread—moulded in one piece to cover tread and riser.

This latter type is obtainable in two different sections, viz., with bull-nosing (as illustrated at left) or a perfect right angle for stairs, not finished with a projecting nose.

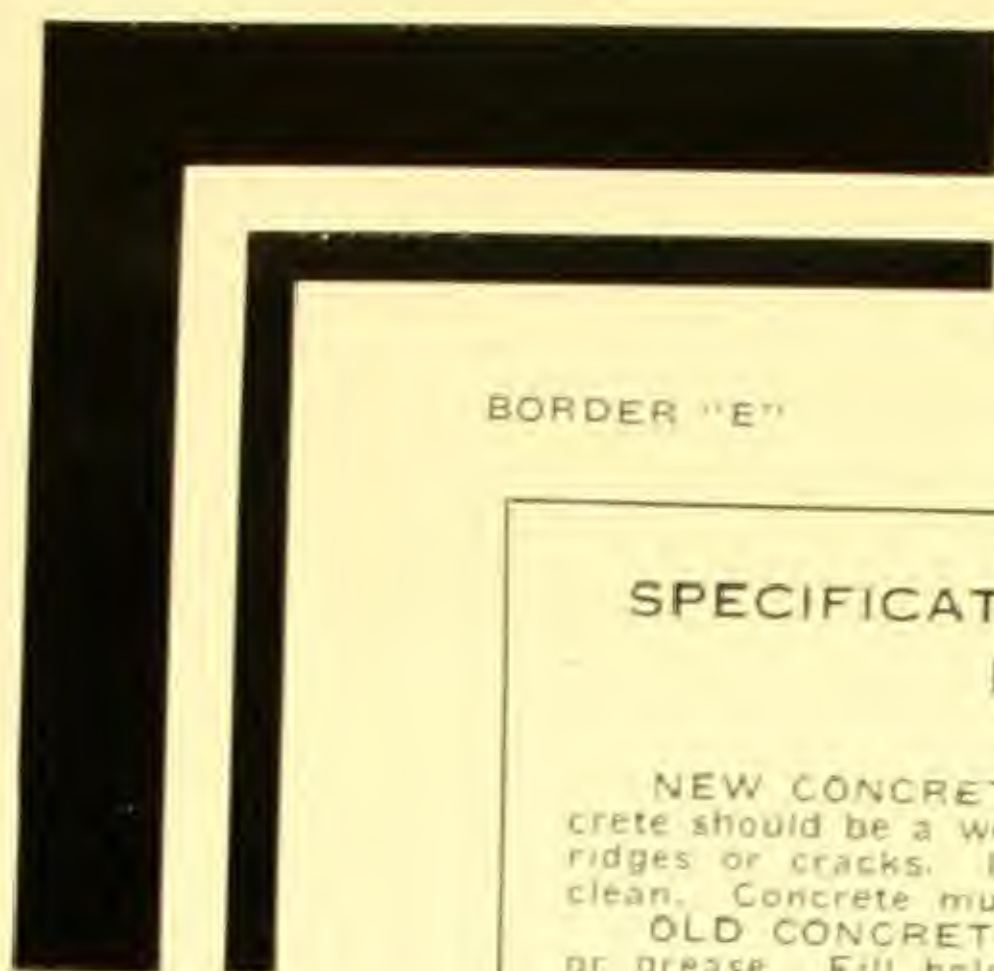
When enquiring for or ordering Dunlop Perdriau stair coverings, please give the following details:—

- (1) Number of steps.
- (2) Length of treads.
- (3) Depth of treads, as A on sketch. This size should be from face of riser to front of nose. Sketch showing full sizes of winders, if any, should be given.
- (4) Thickness of nose, C on sketch. A cardboard template to give both C and D is better.
- (5) Height of riser B.
- (6) Size of landings, if any.
- (7) Thickness of rubber for treads. We recommend material  $\frac{1}{2}$ -in. thick, but  $\frac{3}{16}$ -in. thick is suitable for residences.
- (8) Design.
- (9) State if rubber is to be full width of stairs.

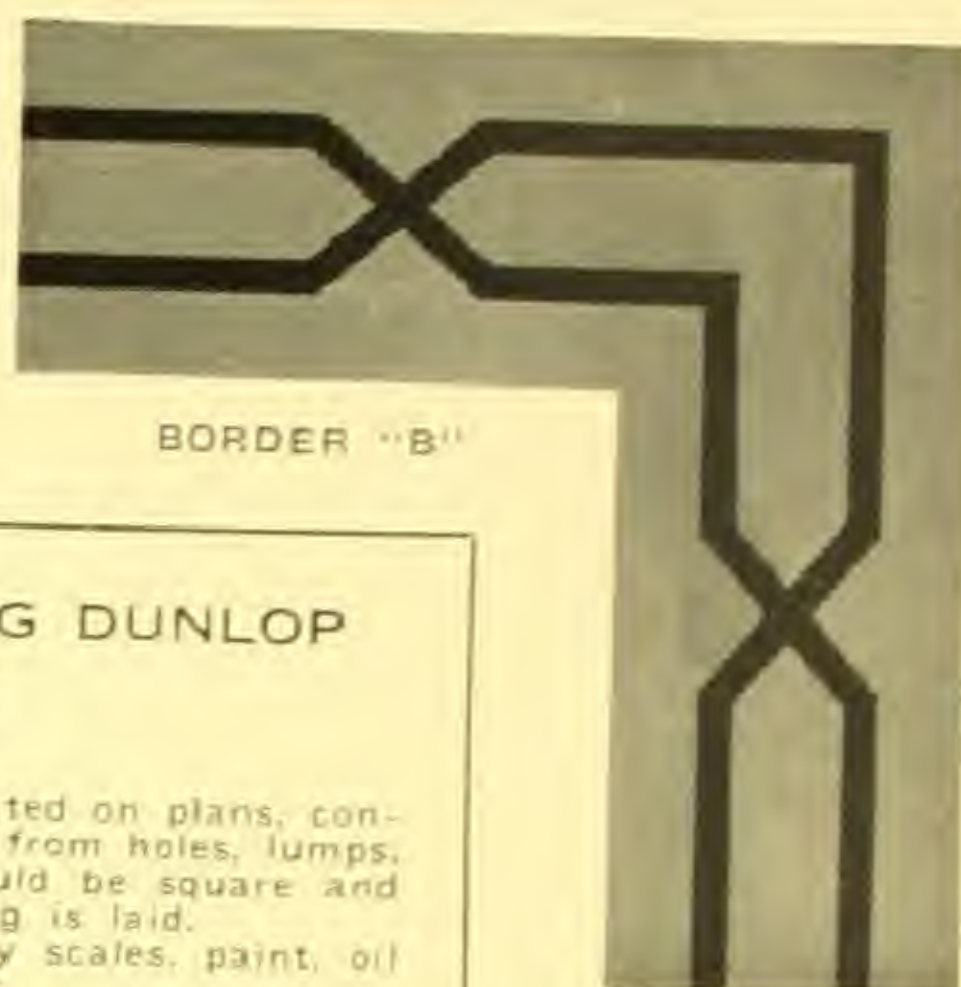


(Continued on next page)





BORDER "E"



BORDER "B"

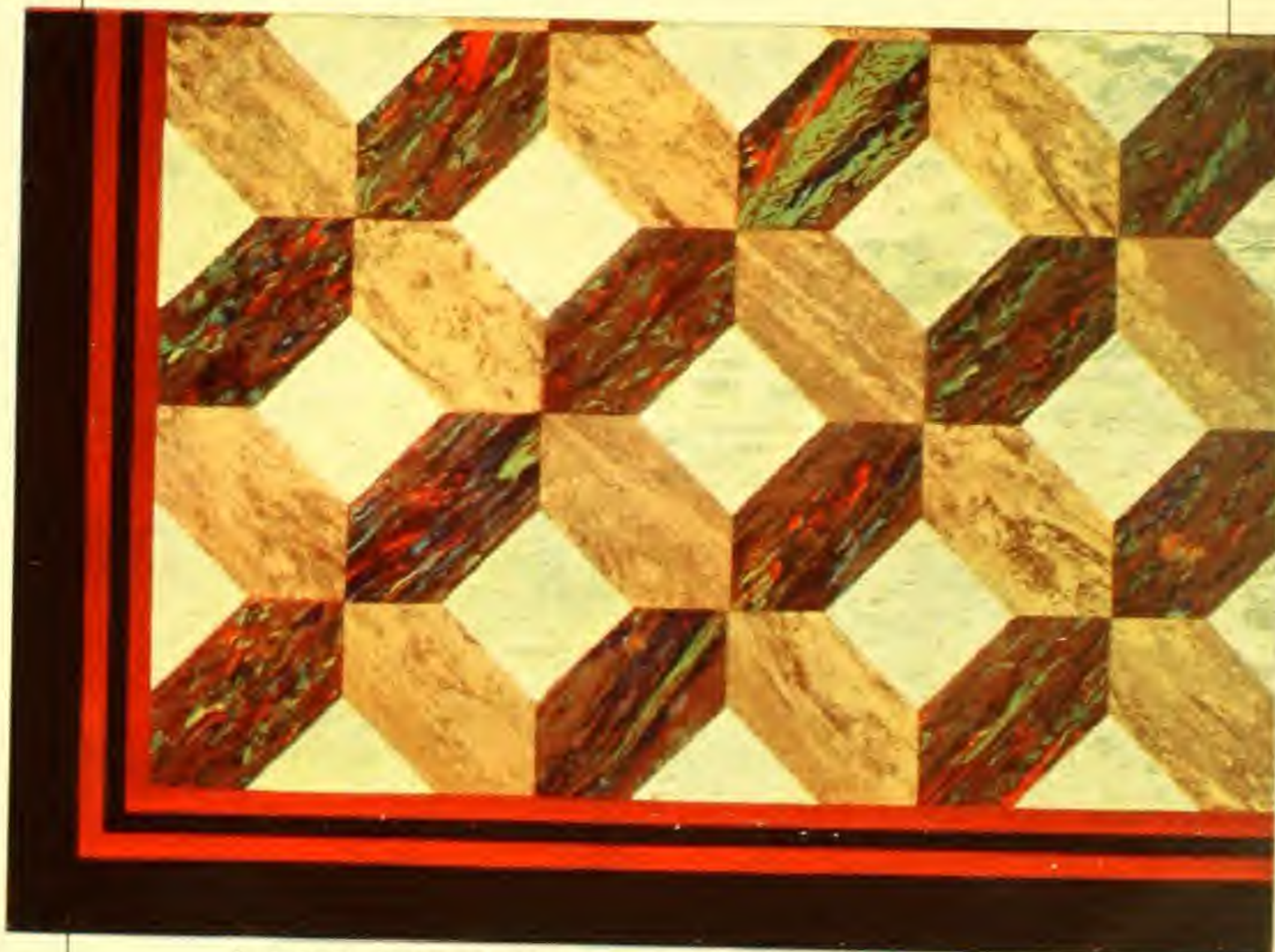
### SPECIFICATION NOTES FOR INSTALLING DUNLOP PERDRIAU RUBBER FLOORS

#### PREPARATION OF SUB-FLOOR.

**NEW CONCRETE.**—In floor space where rubber is designated on plans, concrete should be a wood-floated surface and perfectly level, free from holes, lumps, ridges or cracks. Intersections between walls and floors should be square and clean. Concrete must be thoroughly dry before rubber matting is laid.

**OLD CONCRETE.**—Clean surface thoroughly, removing any scales, paint, oil or grease. Fill holes and depressions flush with level of floor.

**NEW WOOD.**—Sub-floors should be thoroughly dried and well-seasoned timber, tongued and grooved. Surface, if necessary, should be planed to make perfectly level. (Continued below.)



A typical design of Inlaid Rubber Matting (Design No. 7)—  
A marbled effect with Border "F"

**OLD WOOD.**—Loose boards should be nailed tight and all defective or badly worn boards replaced. All unevenness should be planed smooth and surface left even and level.

**MATERIAL.**—All rubber matting and stair-treads indicated on drawings or set out below shall be Dunlop Perdriau Rubber Matting and shall be laid by the Dunlop Perdriau Rubber Co. Ltd. to the architect's design (or approval). Allow a P.C. sum £ . . . for the installation complete.

BORDER "D"



BORDER "A"



Other borders than those shown on this page are available—also the different borders depicted can be adapted for surrounding any type of design. (See Matting Brochure.)

*Illustrated Art Brochure, replete with colour designs, borders, etc., will be mailed on request to Architects.*

*Illustrated Art Brochure, replete with colour designs, borders, etc., will be mailed on request to Architects.*



## SECTION L

[Containing S.A.A. Filing Sections Nos. 29 and Sub-sections 29e and 29f]

### PLUMBING — and — PLUMBING FIXTURES





<div>29b</div> <div>S.A.A. File No.</div>	<div>McPHERSON'S PTY. LTD.</div> <div>ESTABLISHED 1860</div> <div>           COLLINS STREET    BATHURST STREET    WAYMOUTH STREET    MURRAY STREET            MELBOURNE                      SYDNEY                      ADELAIDE                      PERTH         </div>	<div>PIPE FITTINGS</div>
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## ROCKWOOD PRESSED STEEL UNIONS

## Strength

The strength of Rockwood Pressed Steel Unions exceeds greatly that of ordinary cast unions. They have been found unrivalled on jobs where high pressures are handled. Each Rockwood Union is factory tested to a pressure of 1,000 pounds.

Where Unions are to be uncoupled occasionally, Rockwoods should certainly be specified. There are two main reasons for this:

Firstly, each Rockwood Union has solid bronze seats, which, of course, cannot corrode or rust.

Thus, when being taken apart, there is none of the difficulty sometimes experienced when the iron seats of ordinary unions are corroded or rusted.

Secondly, being made of steel, the Rockwood Union will be unaffected by the rough treatment received from wrenches.

## Rustproof

One of the many processes through which Rockwood Unions pass in manufacture is sherardizing. The steel unions are placed in a furnace chamber, packed in zinc-dust, and subjected to a heat sufficient to cause the zinc vapour to soak into the surface, thus forming a rustproof coating.

## Durability

Under ordinary conditions it is practically impossible to limit the life of a Rockwood Pressed Steel Union. The sherardizing and consequent rustproof condition give double assurance of good wear.

## Advantages

Malleable iron combines the advantages of cast iron in respect to the ease with which forms may be cast, with a high degree of toughness, ductility and strength. Its ductility and malleability are such that it may be bent or twisted to a considerable degree, even when cold. The rough usage that ordinary pipe fittings are subjected to when being taken up is often the cause of fractures developing in the fitting, with the probability of subsequent leakage. The use of malleable iron fittings assures the Architect that no damage can develop through harsh treatment, and he can confidently rely on tight joints being made if B.S.I.G. Fittings are used. The unfailing accuracy of the threads ensures perfect alignment in the longest pipe line.

## Tests

Every Fitting is guaranteed to have been carefully examined and tested to 300 lbs. pressure. One interesting example of the various tests carried out by David Kirkaldy and Sons' Testing and Experimenting Works, London, was one wherein an Elbow Fitting was subjected to numerous pressures, and it was found able to withstand the enormous pressure of 12,000 lbs. per square inch. Details regarding other tests are shown in the B.S.I.G. Catalogue.



## Uses

Rockwood Pressed Steel Unions are suitable for all requirements. They can also be furnished with Bronze Seats or Monel Metal Seats, and are recommended for Oil, Steam, Water, Air, Gas, Chemicals, Petrol, etc.

## Some Prominent Users

Rockwood Unions are used exclusively by the British Imperial Oil Co., Australian Iron & Steel Co., The Australian Gaslight Co., whilst the N.S.W. Government Railways recently used 15,000.

In addition, the following are a few of many other concerns which use Rockwood Unions:—

Tramway Board, Melbourne.  
 State Electricity Commission, Victoria.  
 Victorian Railways.  
 Lincoln Engineering Co.  
 Vacuum Oil Co.  
 Agricultural Dept., Victoria.  
 Wakefield & Co., S.A.  
 Swan & Co., S.A.  
 R. C. Smith, S.A.  
 Shipman, King & Co., Melb., etc., etc.

## Sizes

With Bronze Seats:— $\frac{1}{4}$ in.,  $\frac{1}{2}$ in.,  $\frac{3}{4}$ in., 1in., 1 $\frac{1}{2}$ in., 2in., 2 $\frac{1}{2}$ in., 3in.

With Monel Metal Seats:—As above, but not exceeding 2in.

## Prices

Latest prices and, if desired, sample of Union, will be sent on application.

## B.S.I.G. MALLEABLE IRON FITTINGS

## Specification Clauses

All fittings for water, gas, steam, oil or petrol shall be genuine B.S.I.G. Malleable Iron Fittings; all joints shall be screw joints with tapered threads made up with red lead; all burrs formed in cutting shall be reamed.

## Fittings and Sizes Available

Elbows, tees, sockets, bends, etc., from  $\frac{1}{2}$ in. to 6in. For water, gas, steam and oil pipe lines.

Railing Fittings:—Sockets, elbows, tees, crosses, flanges, side outlet fittings, and other necessary parts to complete fencing and railing from  $\frac{1}{2}$ in. to 2in. sizes.

## Trade Mark

B.S.I.G. is the registered trade mark, to be found on all such genuine fittings.

## Selection

Five thousand two hundred different fittings are made by B.S.I.G. Manufacturers, the majority of which are illustrated, classified and priced in the B.S.I.G. Catalogue, which McPherson's will forward to anyone desiring information on fittings.

## Finish

B.S.I.G. Fittings are galvanized inside and out by a special hot process, which time and practice have proved to be the most efficient.





B.S.I.G. Fittings have no superiors.

**Control of Manufacture**

It is possible to obtain lower-priced fittings, but of these a certain percentage will be waste. Other considerations which should decide the Architect to specify B.S.I.G. Fittings are the great loss of labour should it become necessary later to replace faulty, cheap fittings, and the possible damage which may be caused through leakage. One of the reasons why there are differences in price is that only few firms have attained perfection in the manufacture of malleable castings.

The process requires constant supervision at the Works to see that the exact proportions of manganese, silica, phosphorus, bronze, sulphur, etc., are used. Also essential is the continuous inspection and control of the treatment in the cupolas and annealing ovens, of the extraction of carbon, of the flattening test, which must show a very high percentage of reduction of diameter by crushing without any sign of fracture of the walls, also several other tests.

The long experience and the high degree of skill attained by the B.S.I.G. Manufacturers, together with the extra tests and the especially careful supervision may result in B.S.I.G. Malleable Fittings being slightly higher in price. But, as already stated, they are much cheaper in the long run.

Particulars and Prices and a special B.S.I.G. Catalogue will be sent on request.

**"RAPID" MOTOR-DRIVEN CENTRIFUGAL PUMPS****Pumps**

McPherson's extensive range of Pumps include Semi-Rotary Pumps, Hydraulic Rams, "Rapid" Centrifugal Pumps, "Rotex" Power Rotary Force Pump, "Macson" Double-Acting Piston Pump, Premier Geared Pumps, "Macson" Petrol Storage Outfit.

*Pump Catalogues are available on request*

**"Rapid" Motor-Driven Centrifugal Pump**

A convenient and economic small pump which occupies little space and has a great capacity.

**Use**

Used extensively for emptying septic tank effluent chambers, cellars, all circulating purposes, overhead tank pumping, etc.

**Description**

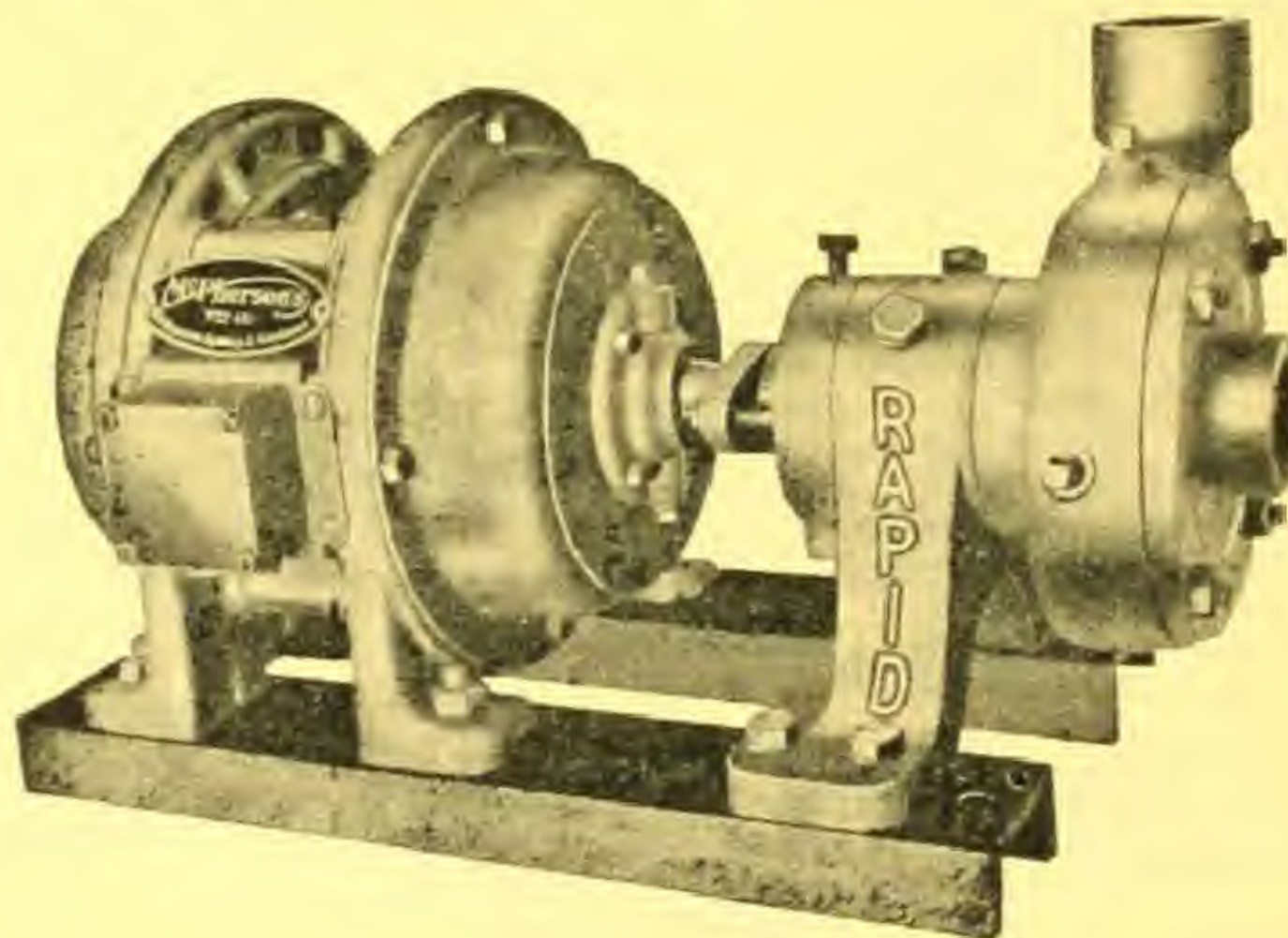
The 1½ in. "Rapid" Single Stage Centrifugal Pump, as illustrated, is fitted to extended Pulley Spindle of 1 h.p., 415-Volt, 3-Phase, 50-Cycles, A.C. Electric Motor, and the whole arranged on steel base, no centre bearing or coupling being required. The Pump Spindle, which is 1 in. diameter, is the largest fitted to any make of 1½ in. Centrifugal, and is supported by bearing in Pump body 4½ in. long, the two motor bearings being ball or ball and roller.

**Special Features**

Special features of this Pump are the elimination of the centre bearing, which reduces the friction and consequently the oil consumption to a minimum; and the strong steel base, superior to light cast-iron bases, which fracture easily.

**Capacity**

The capacity against a total head of 45 feet is approximately 1,200 gallons per hour and increases as this head is decreased.

**"RAPID" CENTRIFUGAL PUMP**

The pump bowl may be swivelled in any direction. Attention is drawn to the guard which prevents water being sprayed on to the Stator Coils.

**Motor**

The motor is a high-grade, well-known Australian production as recommended by the leading electrical engineers throughout the Commonwealth.

**OTHER PRODUCTS:**

AIR COMPRESSORS

BATH HEATERS AND BATHROOM  
FITTINGS

BATHS AND SINKS

BITUMEN PAINT

BOLTS AND NUTS

BRASSWARE

BUILDERS' HARDWARE

BUILDERS' IRONWORK

CONCRETE CARTS AND BARROWS

CONCRETE MIXERS

DAMP COURSES

DOOR TRACK FITTINGS

DOOR CLOSERS

EARTH SCOOPS

LEVELLING INSTRUMENT

METLEX (WALL PLUGS)

PAINTS, OILS AND COLOURS

PIPES AND FITTINGS

ROOFING MATERIALS

VARNISH



# RICHARD FOREMAN & SON LIMITED

WORKS AND OFFICES:

CHAPEL STREET, MARRICKVILLE  
SYDNEY, N.S.W.

TEL. L 1473.

29i

S.A.A. File No.

"FOREMAN"

## Products

"Foreman" Standardised Flange Baths, Cast-iron Sinks, Cisterns, Soil and Rainwater Pipes and Fittings.

## Quality

Only first-class materials are employed in manufacture. Special machining and careful assembly of the products at all times maintains a quality and reliability which cannot be excelled.

## THE "FOREMAN" STANDARDISED FLANGED BATH

### Standardisation

Means elimination of carrying large stocks of various patterns, simplicity of design and application in practice, greater efficiency in production and economy in service.

### Advantages

The "Foreman" standardised bath can be built in any position, the tiling being executed below or above the flange; wafer is prevented from reaching the floor by the ridged flange.

### Workmanship

Manufactured by highly skilled and experienced tradesmen and executed under conditions where rigid supervision and careful inspection in all departments effectively maintain at all times high-class productions only.

### Finish

The finish, in pure white leadless porcelain enamel, resulting in a perfect lustre and faultless surface, is an assurance that only first-class materials are employed.

### Dimensions

The bath is made in one standard size only, viz., 5 ft. 6 in. long by 2 ft. 6 in. wide; the centre of the plug-hole is 1 ft. 3 in. and 1 ft. from the back and side flanges respectively.

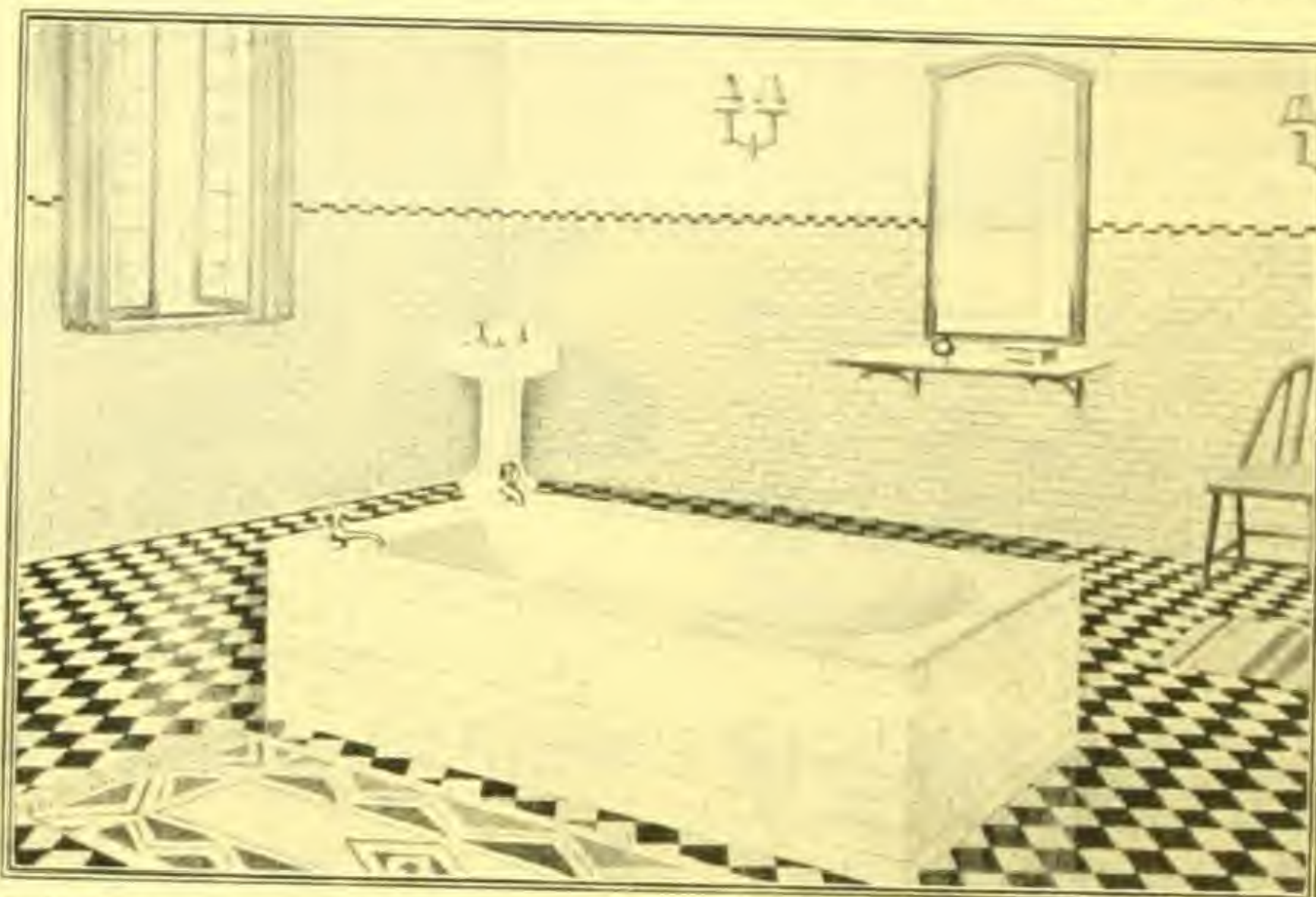
### Simplicity of Application

Being so designed that it can be effectively placed to suit special requirements, the "Foreman" bath can be installed in any position, including the centre of the

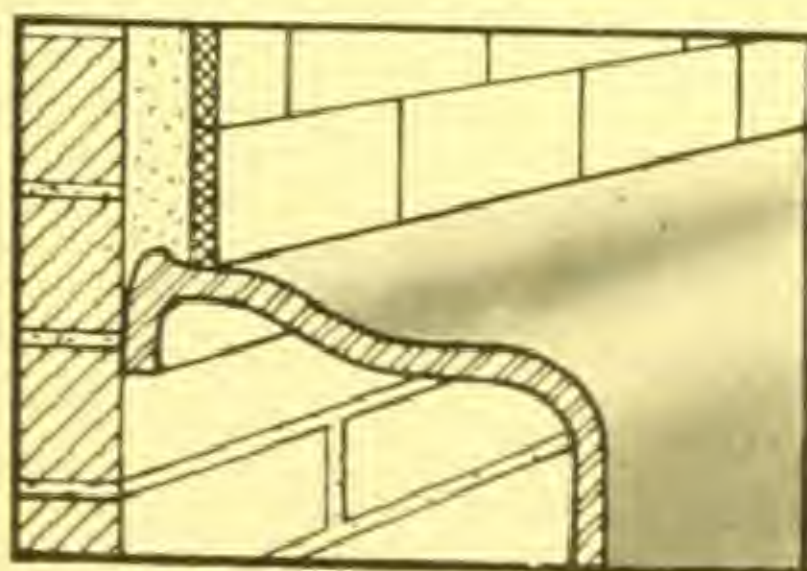
bathroom. It is especially adaptable in hospital bathrooms, and fulfils all sanitary demands to the smallest detail.

### Service to Architects

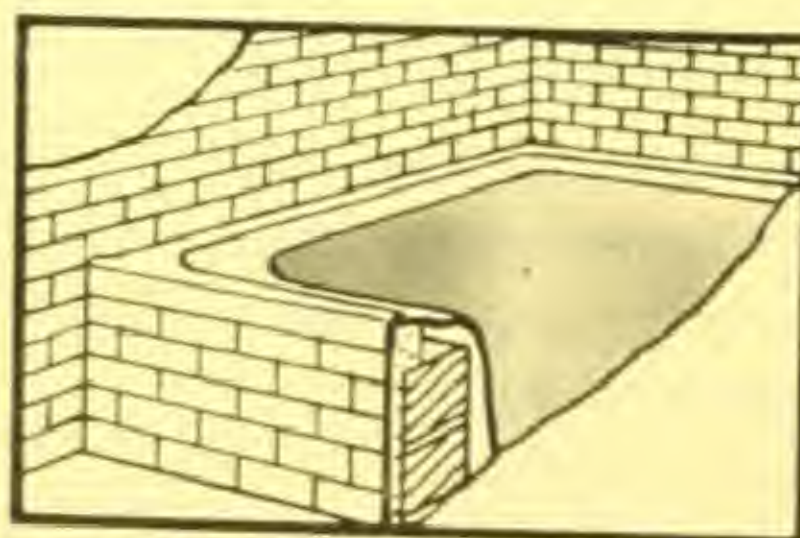
The accumulated information in regard to bath manufacture, resulting from many years of manufacturing experience, is at the disposal of the architect confronted with problems where a high-class product demands correct selection.



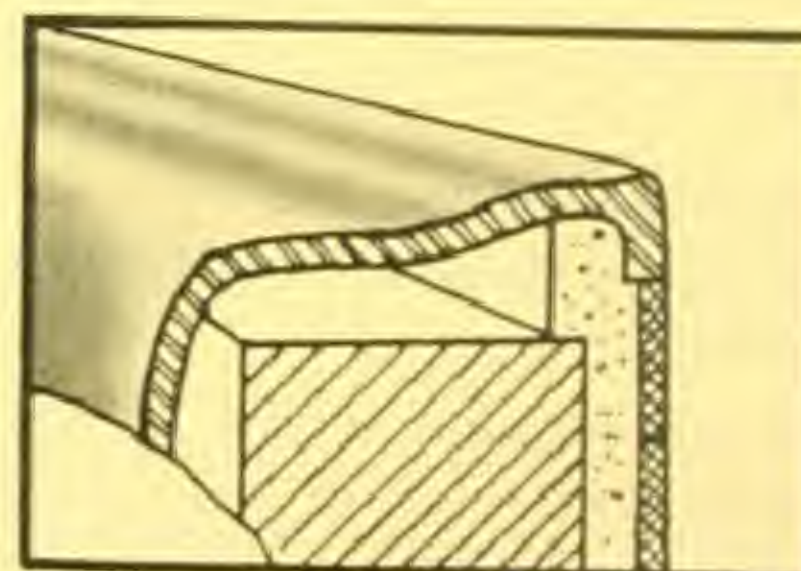
A Modern Bathroom Effect Obtainable with a "Foreman" Standardised Bath.



Section Showing Method of Tiling to Wall.



Section Showing Bath Tub Built in Corner.



Section Showing Method of Tiling to Bath Front.



**"FOREMAN" STANDARD CAST IRON PIPES AND FITTINGS****Manufacture**

All "Foreman" units are manufactured to fulfil the various functions connected with water and sewerage installations, and suitably perform a life and service in whatever capacity they are required.

**Materials**

Only the best materials of their respective kinds are used. Great care is exercised and maintained in the treatment and preparation of the various properties used, so that the maximum high standard of commercial production is produced.

**Enamel Finish**

To those who desire the highest form of sanitary finish we recommend the special faced internal bore glass enamelled pipe which is manufactured to resist rust or corrosive attack and to maintain a smooth internal wall surface. The enamel lining preserves the life of the pipe, allowing a perfectly clear passage offering no resistances to encumbrances which may pass through the pipe.

**Standards and Range**

All sections are manufactured to conform to the regulations as laid down by the Sydney Metropolitan Water, Sewerage and Drainage Board Standard.

The following table, together with the illustrated detail, covers the range of units used in the trades of "Plumber" and "Drainer." Special sections required to suit any demand can be produced.

**SOIL PIPES AND FITTINGS.**

Unless otherwise shown, pipe diameters are 2, 2½, 3, 4, 5, 6 in.

**Soil Pipe:**

- 6 ft. Socket and Spigot
- 4 ft. Socket and Spigot
- 3 ft. Socket and Spigot
- 2 ft. Socket and Spigot
- 6 ft. Double Socket

**RAINWATER PIPES AND FITTINGS.**

Unless otherwise shown, pipe diameters are 2, 2½, 3, 4, 5 in.

**Pipe—**

6, 4, 3, and 2 ft. lengths.

**Bends**

- Junctions:
- Single.
- Double.

**Bends:**

- Plain.
- Vented—2, 2½, 3, 4 in.—
- 4, 5, 6 in.

**Junctions:**

- Plain.
- Double.
- Inverted.
- Double Inverted.
- Unequal branches—2½, 3,
- 4, 5, 6 in.

**Swan Necks or Offsets:**

- 1½ inch—2 in. only.
- 3, 4½, 6, 9, 12, 15, 18, 21,
- 24 in. projections.

**Double Sockets or Collars:**

- With or without lugs.

**Shoes****Reducing Sockets—**

- 2½, 3, 4, 5, 6 in.

**Pan Pieces and Short Connecting Pieces:**

- 9, 12, 15, 18, 21, 24 in.
- projections—4 in. only.

**Sanitary Branches for P. Traps:**

- 9, 12, 15, 18, 21, 24 in.
- projections—4 in. only.

**Sanitary Branches for S. Traps:**

- 9, 12, 15, 18, 21, 24 in.
- projections—4 in. only.

**Syphon Traps—**

- 4, 5, 6 in.

**Soil Pipe Vents, No. 55—**

- 4 in. only.

NOTE.—Soil pipes and fittings made in the following degrees:—95, 105, 112½, 120, 135.

NOTE.—Access doors to the above fittings can be supplied.

**Reducing Sockets—**

- 3, 4 in. only.

**Sockets or Collars****Shoes****Heads****Offsets:**

- 1½, 3, 4½, 6, 9, 12, 15, 18,
- 21, 24 in. projections.

**SQUARE AND RECTANGULAR PIPES AND FITTINGS—**

- 4 x 3, 4 x 4, 5 x 3,
- 5 x 4, 6 x 4 in.

**6 ft. Pipes****Bends, Side and Forward****Shoes****Collars****Offsets, Side or Forward**

- 3, 4½, 6, 9 in. projections.

**Junctions:**

- Plain and Uneven
- Branches.

**Heads**

Brass access doors fitted on above fittings and pipes.

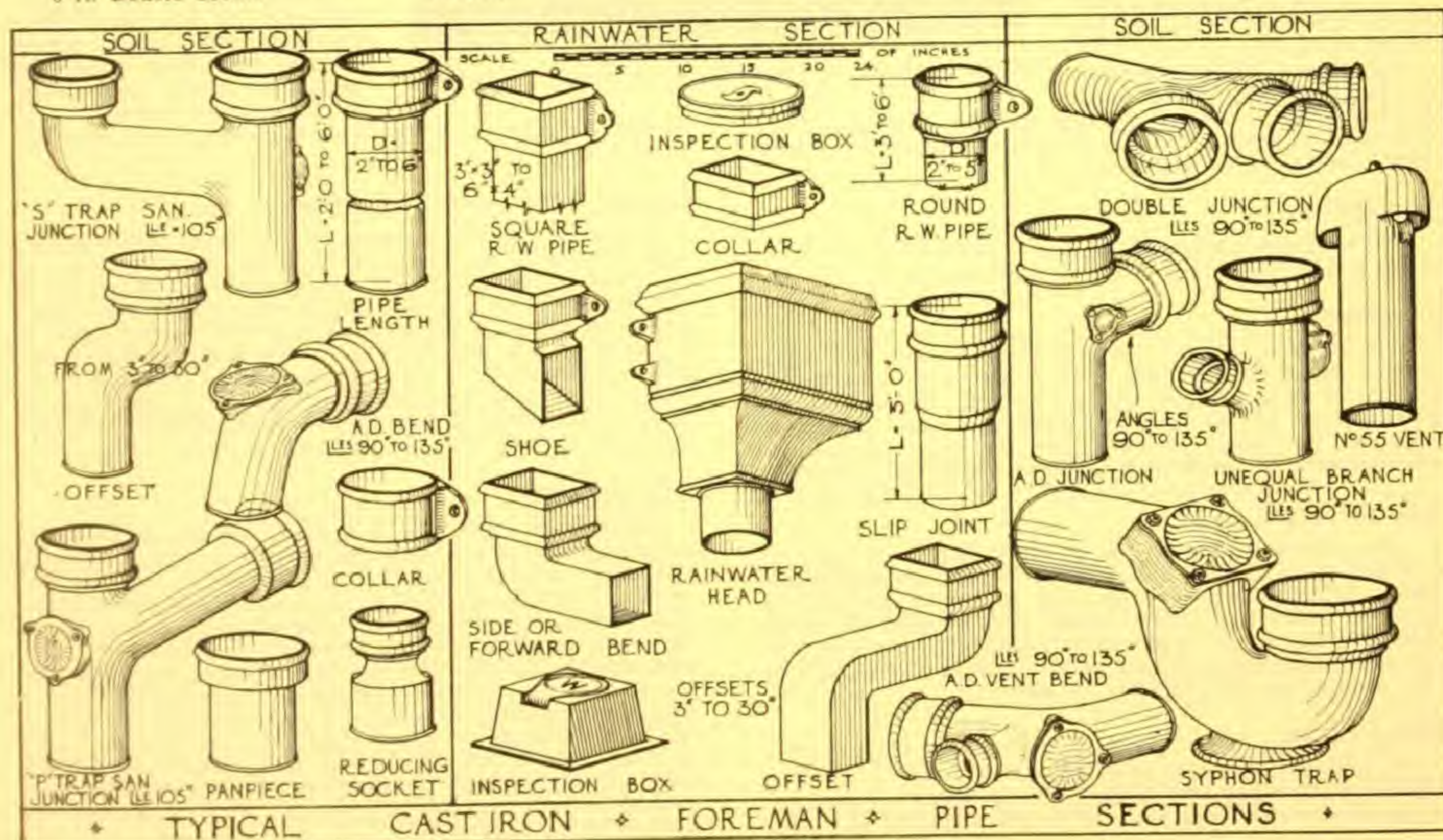
**Footpath Boxes, Square Top.****Inspection Boxes.****CISTERNS.**

"Foreman" 2-gallon C.I. Cistern.

"Foreman" 9-gallon C.I. Multiflush.

"Foreman" 2-gallon Patent Air-Lock Syphon Cistern.

NOTE.—The above cisterns are also available with internal enamel lining and external finishes of paint or white enamel. Bracket for Multiflush Cisterns can be supplied with a painted or white enamelled finish.



(Drawn by the Architectural Staff of Ramsay's Catalogue)



# STATE MONIER PIPE AND REINFORCED CONCRETE WORKS

[Late Gummow, Forrest & Co. Ltd. Established 1897]

HEAD OFFICE: 8-14 BOND STREET, SYDNEY

Works: Macdonald Street, ERSKINEVILLE

Works: Smart Street, CARRINGTON (NEWCASTLE). Newcastle 79

Address All Enquiries to Box 3388 R. G.P.O., SYDNEY

Tels.—  
B 3891  
B 5883

CONCRETE  
PIPES

[For Other Products, See Page 292]

## Products

Our manufactures comprise Monier Circular and Oviform Reinforced Concrete Pipes, Centrifugally Spun (Hume) Reinforced Concrete Pipes, Reinforced Concrete Garden Rollers, Incinerators, Splayed Pipes and Tidal Flaps, Pile Armour, Plates, etc., and Septic Tank Installations, see page 29C2.

## Manufacture

Reinforced Concrete Pipes are manufactured in circular and oviform sections of great variety for use in the construction of sewers, storm-water channels, culverts, etc.

## Quality and Strength

Reinforced Concrete Pipes are manufactured and guaranteed to be of a standard of strength to pass all requirements of Public Works Department and Main Roads Board, but they may be made and guaranteed to suit other requirements if so required. They afford a maximum of velocity and discharge due to the uniformity of section and the smoothness of their internal surfaces.

The pipes are guaranteed to be perfectly sound and straight with a smooth internal surface. To have ends true planes square to axis of pipe or splayed to suit radius of curve ordered.

## Durability

Monier Pipes have been in use in Sydney for over 30 years and show no signs of deterioration.

## Junctions

Junctions are only made to order. The fact that Monier Pipes are provided with a base makes an interchange of right and left hand junctions impossible. It is therefore of the utmost importance that junctions required be stated correctly, and for that purpose we ask that they be ordered invariably looking down stream.

## Splayed Pipes

Very uniform curves can be produced by means of straight pipes if they be splayed to suit the respective radii. These splayed pipes can be manufactured to order to suit any given radius and length of curve measured along the centre line. Splayed pipes are laid and jointed in the ordinary way. Radius should not be less than six times diameter of pipe.

## Short Pipes

In addition to the standard length of 6 ft. for Centrifugally Spun and 3 ft. 7 in. for Monier Pipes, we manufacture short pipes of any length required to order.

## Laying and Jointing

The pipes are manufactured without spigot and faucet to permit of easy handling and close and rigid stacking, both desirable conditions for the prevention of breakages. Monier Pipes are provided with a flat base. Monier and Hume Pipes are usually jointed by means of a bandage of Cement Mortar reinforced by Wire Netting, called a Bandage Joint, a method of jointing pipes which fulfils its purpose under all ordinary conditions.

Other methods of jointing more costly than the former need only be resorted to in exceptional cases, such as pipes situated in ground liable to settlement or heavily charged with water, in which case a collar joint has been found to answer admirably. Collars are manufactured to order.

## Special Pipes for Pressure Mains

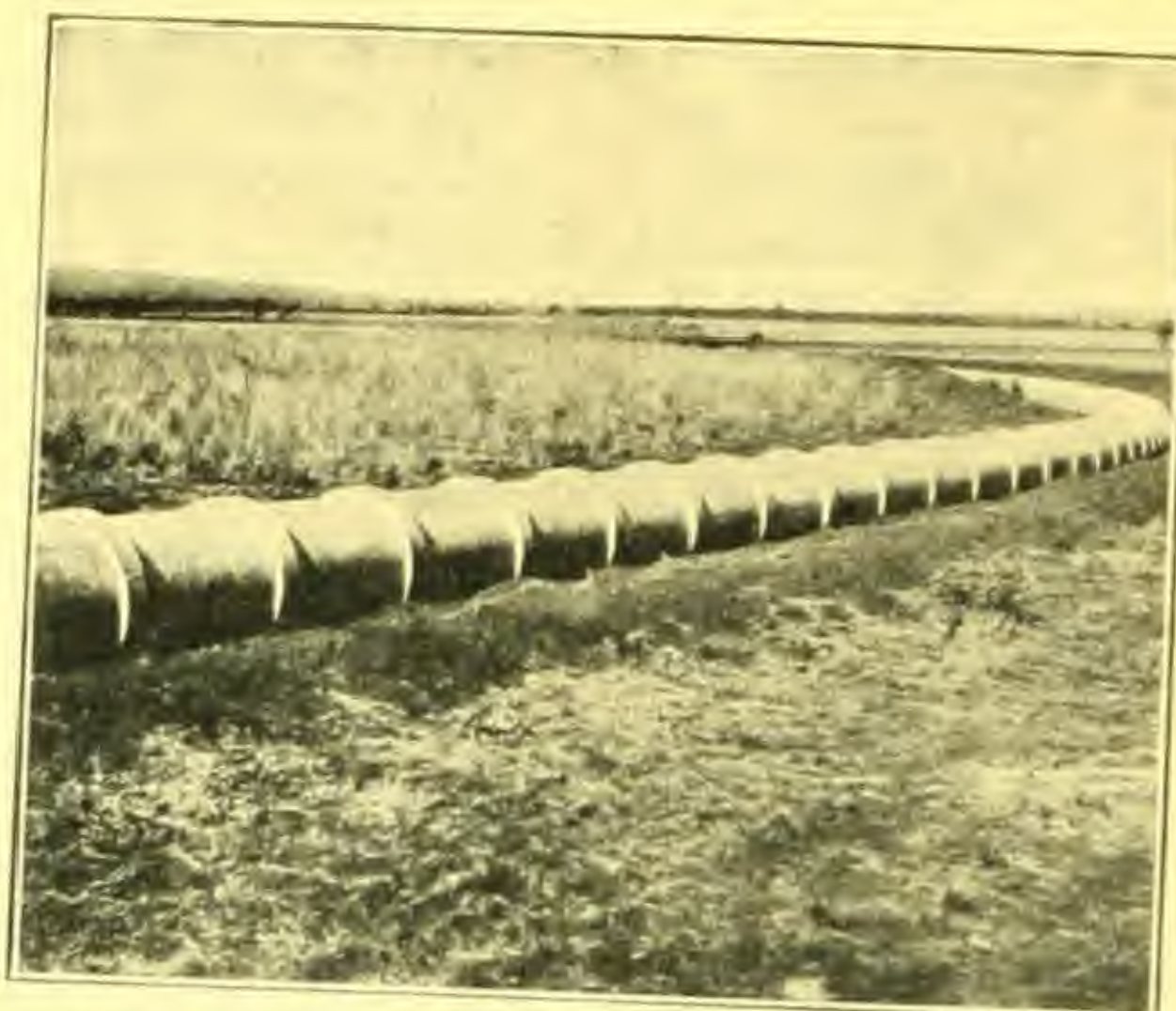
These pipes are manufactured by the Centrifugal Process and have proved satisfactory under quite high pressures. They are not kept in stock, but made to suit special conditions. Advice and quotations will be given as required.

## Special Pipes with Tidal Flaps

Wherever low-lying grounds are to be drained into tidal waters it is necessary to make provision for the exclusion of the latter. For this purpose we manufacture special pipes of various diameters with Tidal Flaps attached, both of Reinforced Concrete. This type of Tidal Flap has found great favour on account of the permanent nature of the materials and the excellent fit. Other pipes may be jointed on to the special pipe to form a drain through the embankment between the low-lying ground and the tidal waters.

## Pile Armour

Reinforced Concrete Pile Armour protects timber piles driven in tidal waters from the ravages of Teredo Navalis and other marine borers. We manufacture tubular Pile Armour of full and half sections of varying diameters. Full section Pile Armour with Bandage Joint and Collar Joint are employed in new structures, when they can be slipped over the pile after the operation of driving, while the half section is employed for the encasing of piles of existing structures where the former method of armouring is inapplicable. Large quantities of the two types of Pile Armour are in use and have proved themselves easy of application, of good appearance, and a most reliable and permanent protection. Full particulars are obtainable on application.



3ft. 6in. Diameter Reinforced Concrete Pressure Pipe Line.



## Cement Lining

The practice of Cement Lining Cast Iron and Welded Steel Pipes has rapidly increased in the last two years. The use of Cement Mortar lining prevents corrosion on the internal surface of the pipe and also provides a smooth and uniform surface. We have cement lined considerable quantities of pipes for the Public Works Department, Metropolitan Water, Sewerage and Drainage Board, and also the Hunter District Water Supply and Sewerage Board, and will quote for any work of this description.

## Service to Architects and Engineers

We are prepared to design and construct, in collaboration with Architects, Reinforced Concrete Buildings, Bridges, Roads, Silos, Water Supply and Sewerage Schemes, also fabrication of Mild Steel Bars for Reinforced Concrete Works.

## TECHNICAL INFORMATION TABLES

## Circular Monier Pipes

Inside Diameter of Pipe.		Length of Pipe.		Discharge Area.	Approximate Weight per Lineal Foot.	Weights by Rail. Approximate Weight per Pipe.		Weights by Boat. Approximate Cubic Tonnage per Pipe.			
ft.	in.	ft.	in.			sq. ft.	cwt.		qrs.	lbs.	cwt.
1	0	3	7	0.78	0	2	3	1	3	14	.10
1	6	3	7	1.77	0	2	6	2	3	14	.23
1	9	3	7	2.41	1	0	2	3	2	14	.30
2	0	3	7	3.14	1	0	27	4	1	21	.38
2	6	3	7	4.91	1	3	0	6	1	0	.58
3	0	3	7	7.07	2	0	26	8	0	0	.81
3	6	3	7	9.62	2	3	17	10	1	14	1.10
4	0	3	7	12.57	3	2	2	12	2	14	1.40
4	6	3	7	15.90	4	0	25	15	0	14	1.76
5	0	3	7	19.64	4	3	21	17	2	21	2.15
6	0	3	7	28.27	6	2	15	24	3	21	3.09

## Oviform Monier Pipes

Inside Dimensions of Pipes.		Length of Pipe.	Discharge Area.	Approximate Weight per Lineal Foot.	Weights by Rail. Approximate Weight per Pipe.	Weights by Boat. Approximate Cubic Tonnage per Pipe.	
ft.	in.	ft.	sq. ft.	cwt. qr. lb.	cwt. qr. lb.	cu. tons	
1	3 X 0	10	3 7	0.81	0 2 1	1 3 7	.11
1	6 X 1	1	3 7	1.24	0 2 26	2 2 14	.17
1	9 X 1	1	3 7	1.77	0 3 24	3 1 21	.24
2	1 X 1	6½	3 7	2.42	1 0 26	4 1 21	.32
2	5 X 1	9	3 7	3.17	1 2 2	5 1 21	.41
2	9 X 1	11½	3 7	4.03	1 3 7	6 2 0	.52
3	3 X 2	2	3 7	5.21	2 0 17	7 2 21	.65
3	6 X 2	4	3 7	6.09	2 2 25	9 3 0	.77
4	0 X 3	0	3 7	9.19	3 1 2	11 2 0	1.07
4	3 X 3	3	3 7	10.61	3 2 20	12 3 22	1.21
4	6 X 3	5	3 7	12.14	4 0 10	14 1 16	1.38

## Hume Patent Centrifugal Pipes

Manufactured at Carrington, Newcastle.

Inside Diameter of Pipe.		Length of Pipe.		Discharge Area.	Approximate Weight per Lineal Foot.		Weights by Rail. Approximate Weight per Pipe.			
ft.	in.	ft.	in.		sq. ft.	cwt.	qrs.	lbs.	cwt.	qrs.
1	3	6	0	1.22	0	2	25	4	1	10
1	6	6	0	1.77	1	0	1	6	0	7
1	9	6	0	2.41	1	1	0	7	2	1
2	0	6	0	3.14	1	2	2	9	0	13
2	6	6	0	4.91	2	0	13	12	2	25
3	0	6	0	7.07	2	3	7	16	3	12
3	6	6	0	9.62	3	1	19	20	2	3
4	0	6	0	12.56	4	0	8	24	1	24

Pipes may be obtained in 4 ft., 3 ft., and 2 ft. lengths to order.

## Hume Patent Centrifugal Pipes

Manufactured at Monier Works, Erskineville.

Inside Diameter of Pipe.	Length of Pipe.	Discharge Area.	Approximate Weight per Lineal Foot.	Weights by Rail. Approximate Weight per Pipe.	Weights by Boat. Approximate Cubic Tonnage per Pipe.
ins.	ft. ins.	sq. ft.	cwt. qrs. lbs.	cwt. qrs. lbs.	cu. tons
9	6 0	0.44	1 10	2 0 0	.106
12	6 0	0.78	1 26	2 3 17	.173
15	6 0	1.22	2 25	4 1 10	.270
18	6 0	1.77	1 6 1	6 0 7	.387
21	6 0	2.41	1 1 0	7 2 1	.508
24	6 0	3.14	1 2 2	9 0 13	.652

## Special Pipes with Tidal Flaps

Inside Diameter.		Weights by Rail. Approximate weight of Pipe, Flap and Accessories.			Weights by Boat. Approximate Cubic Tonnage per Pipe, Flap and Accessories.
ft.	ins.	tons cwt. qrs. lbs.			cubic tons
1	6	3	3	7	0.35
1	9	4	3	18	0.46
2	0	6	0	0	0.55
2	6	5	1	21	0.81
3	0	10	2	14	1.11
3	6	13	2	7	1.47
4	0	16	2	14	1.87
4	6	1	0	0	2.32

## Prices

Prices of pipes, etc., can be obtained on application to our Head Office, 8-14 Bond Street, Sydney.

## Freights

On New South Wales Government Railways:—

Under 1 ton—1st Class rates.

1 ton and under 6 tons—"C" Class rates.

In 6-ton lots per 4-wheeled truck—"B" Class rates.

By Coastal and Interstate Boats:—Rate per ton of 40 cubic feet, or deadweight, whichever be most favourable to the shipping company.



# HUME PIPE CO. (AUST.) LTD.

29b

S.A.A. File No.

## Head Office:

"KINNEAR HOUSE," Cr. KING &amp; LITTLE COLLINS STS., MELBOURNE. Tel. C.10754

## Branch Offices:

South Australia: Mile End, Keswick.

Tel. L.5142-3.

West Australia: Subiaco. Tel. B.3642.

New Zealand: 8 Quay Street, Auckland, Tel. 46-271.

N.S.W.: Commercial Road, Rozelle, Sydney.

Queensland: Montague St., South Brisbane, Tel. J.1442-3-4.

Tasmania: Cr. Dunn &amp; Macquarie Streets, Hobart. Tel. 1670.

Branches also in Singapore.

HUME

## Hume Concrete Pipe

The Hume Concrete Pipe is moulded by centrifugal action and results in a very dense, strong, impervious concrete, affording the best possible protection to reinforcement. The concrete, on account of its density, is much less subject to attack and more resistant to attrition and wear than ordinary concretes. By the Hume Patented Process, Centrifugally Spun Concrete Pipes are manufactured for drainage, sewerage, culvert and water supply works.

## Electrically Welded Double Grid Reinforcement

We have pleasure in announcing that we have adopted a new type of electrically-welded reinforcement in connection with the manufacture of our Culvert Pipes. The new process enables us to make a very efficient and accurate **Double Grid Reinforcing Cage**, which has considerable advantages. Formerly, when designing pipes to withstand heavy external loads, the practice was to make a slightly ovalled reinforcement. The manufactured pipe was then marked to show the placement of the reinforcement, and it was necessary to lay the pipe in the trench in the exact position as marked. The adoption of the double reinforcing cage avoids that necessity. The pipe with the new design of reinforcement may be placed in the trench in any position, which results in a saving in handling charges.

## Sewerage, Drainage and Culvert Pipes

**CULVERT PIPES**—Supplied in 4 ft. lengths, sizes 9 in. to 75 in. Sizes 9 in. to 21 in. with butt joints; 24 in. to 75 in. flush joints—for internal jointing.

**DRAINAGE AND SEWERAGE PIPES**—Supplied in 6 ft. lengths, sizes 4 in. to 12 in., and 8 ft. lengths, sizes 15 in. to 75 in. Sizes up to 21 in. spigot and faucet, 24 in. to 75 in. flush joints—for internal jointing.

Sizes 4 in. to 21 in. are also available with plain ends for bandage joints.

Non-reinforced Concrete Pipes are also manufactured 4 in. to 9 in. in 3 ft. lengths; 12 in. to 21 in. in 4 ft. lengths. Joints, spigot and faucet.

**HYDRAULIC PIPES**—These pipes are supplied in 6 ft. lengths, 4 in. to 9 in., and 8 ft. lengths, 12 in. and over.

Steel Collars are supplied for jointing, and a number of lead and yarn joints are used to allow for expansion and contraction.

## Representative Installations

### HYDRAULIC

Maryborough Waterworks Trust—1st Contract: 52,000 feet of 12 in. Reinforced Concrete Pipes and Steel Concrete-Lined Pipes. Pressure up to 400 feet head. 2nd Contract: 22,300 feet of 15 in. Reinforced Concrete Pipes, 250 feet head.

Beaufort Waterworks Trust—1st Contract: 33,000 feet of 6 in. Reinforced Concrete Pipes, 150 feet to 250 feet head. 2nd Contract: 15,000 feet of 8 in. Reinforced Concrete Pipes, 150 feet to 250 feet head.

### SEWERAGE

Melbourne & Metropolitan Board of Works—140,000 feet of 6 in. Reinforced Concrete Pipes. Over 200 miles of Sewerage Pipes, 4 in. to 24 in., have been supplied to this Board.

Ballarat Sewerage Authority—150,000 feet of 6 in. Reinforced Concrete Pipes; 2,000 feet of 12 in. Reinforced Concrete Pipes. The above authority have used over 100,000 feet of Hume Sewerage Pipes.

Geelong Waterworks & Sewerage Trust—The above authority have used over 100,000 feet of Hume Sewerage Pipes.

Echuca Sewerage Authority—62,000 feet of 4 in., 6 in., and 9 in. Reinforced Concrete Pipes.

Mildura Sewerage Authority—42,000 feet of 6 in. to 15 in. Reinforced Concrete Pipes.

### DRAINAGE

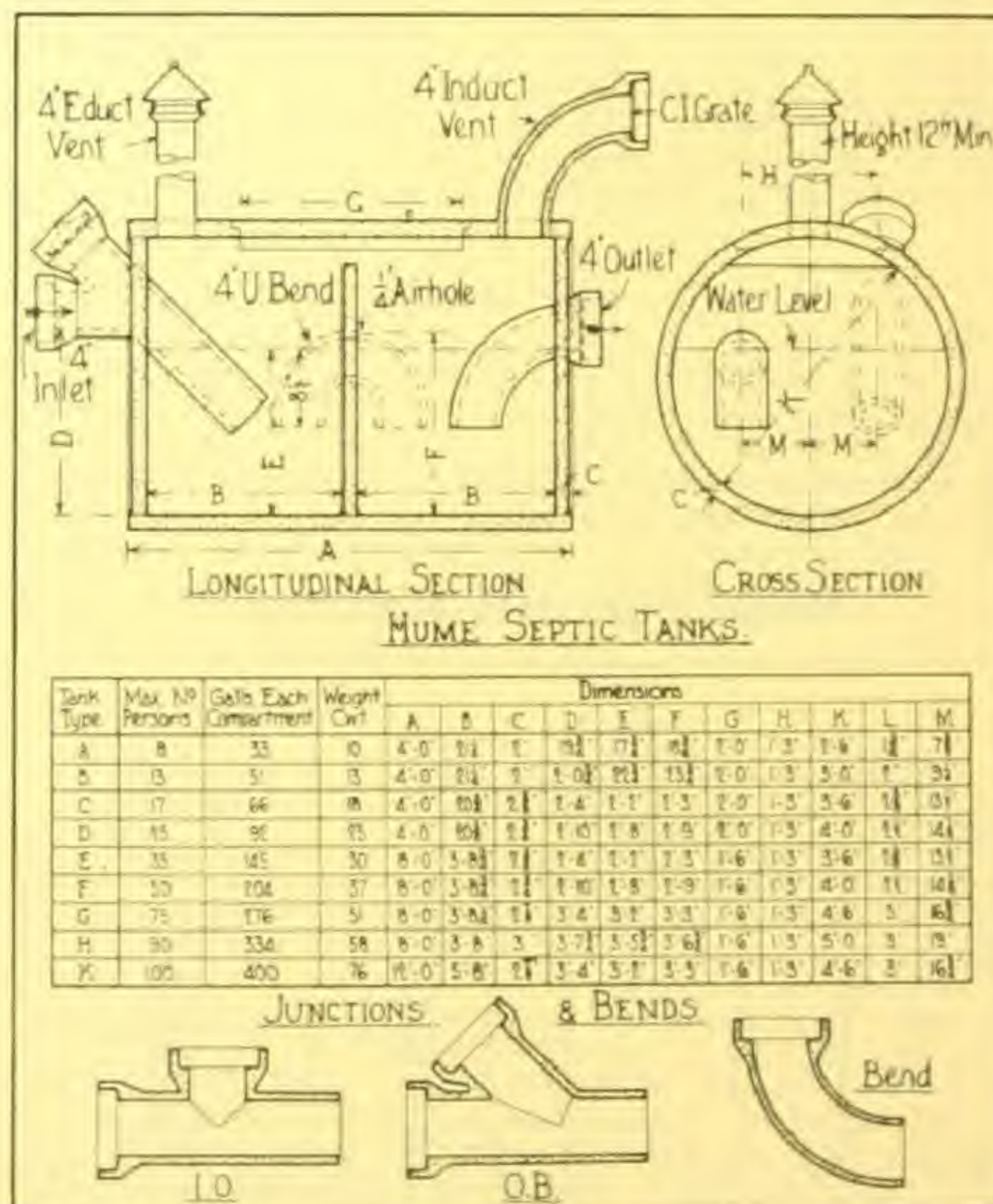
Many thousands of feet of large-sized Drainage Pipes have been supplied to Melbourne & Metropolitan Board of Works and Suburban Councils, sizes 30 in. to 75 in. diameter, the latter being the largest size Concrete Pipes made in Victoria.

## Hume Septic Tanks

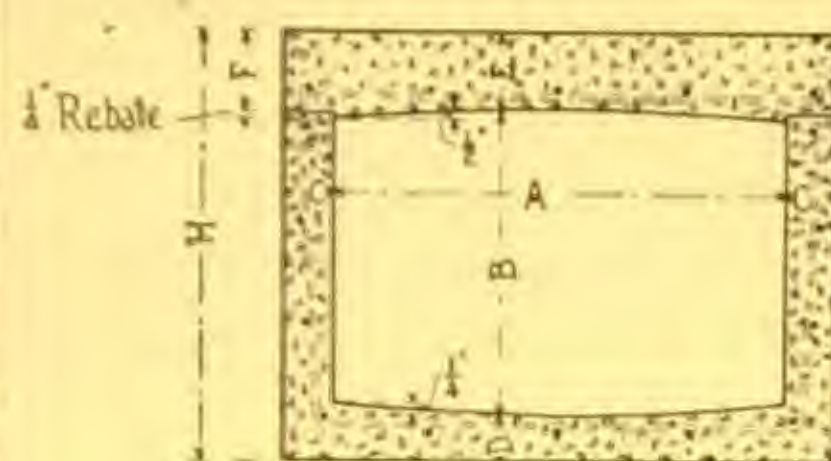
For sewage disposal systems adapted to individual buildings, the greatest efficiency is obtained by the use of septic tanks, and the disposal of the sewage effluent from these tanks by filtration through the ground by means of agricultural tile drains or soakage wells. Hume Septic Tanks are moulded similar to Hume Concrete Pipe, all reinforced. They are easily installed; installation being only a matter of levelling up. Simple instructions are furnished for installation, or we will install the complete plant, including all drain pipes and pits, etc.

## Sewer Pipes

A full range of concrete sewer pipes are manufactured which includes straights, bends, junctions, and all other appurtenances necessary for sewerage drainage work, all being manufactured by our patented process which ensures a dense, strong, impervious concrete.



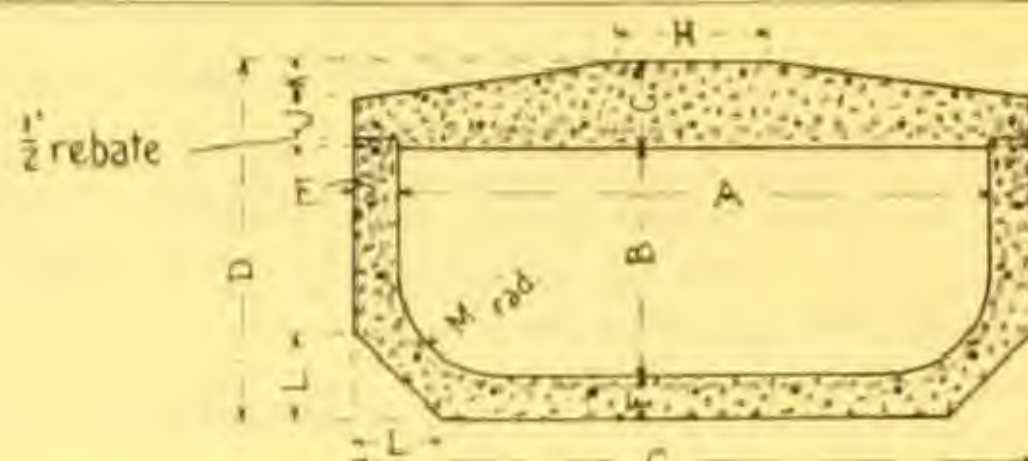




Each Unit  
40' long

### REINFORCED CONCRETE BOX CROSSINGS.

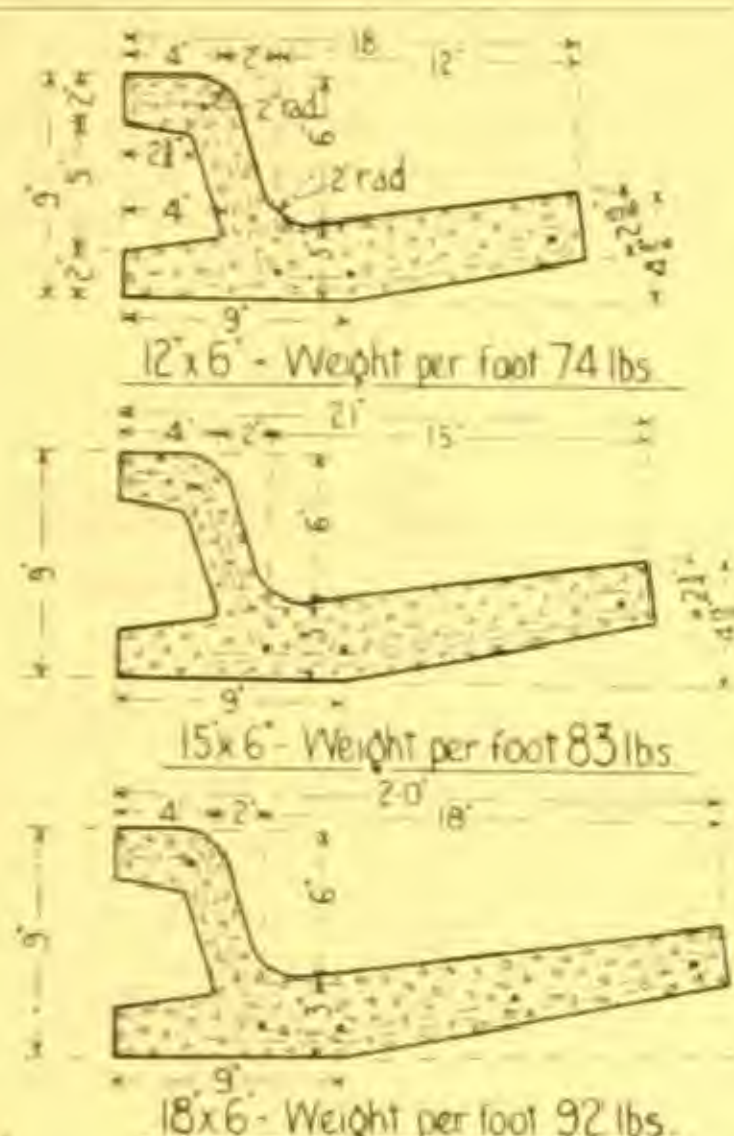
Size	Wt per ft. (lb)	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
12 x 4	80	33	12	4	1	1	3	2	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
12 x 6	87	100	12	6	1	1	3	2	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
15 x 4	112	117	15	4	1	1	3	2	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
15 x 6	110	115	15	6	1	1	3	2	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
18 x 4	130	132	18	4	1	1	3	2	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
18 x 6	136	140	18	6	1	1	3	2	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
24 x 4	162	166	24	4	1	1	3	2	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
24 x 6	167	171	24	6	1	1	3	2	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1



Each Unit 40' long

### REINFORCED CONCRETE BOX CULVERTS.

Size	24	24	24	24	30	30	30	30	30	36	36	36	36	36	36	36	36	48	48	48	48	48	48	48	48	48	48
A	24	24	24	24	30	30	30	30	30	36	36	36	36	36	36	36	36	48	48	48	48	48	48	48	48	48	48
B	9	12	15	18	24	9	12	15	18	24	9	12	15	18	24	27	30	9	12	15	18	21	24	27	30	33	36
C	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
D	16	19	22	25	27	16	19	22	25	27	17	20	23	26	28	31	34	17	20	23	26	29	32	35	38	41	44
E	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	3	3	3	3	3	3	3	3	3	3
F	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	3	3	3	3	3	3	3	3	3	3
G	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	6	6	6	6	6	6	6	6	6	6
H	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
I	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
J	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
K	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
L	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
M rad.	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
lbs per ft	150	170	185	200	215	230	245	260	275	290	305	320	335	350	365	380	395	410	425	440	455	470	485	500	515	530	545



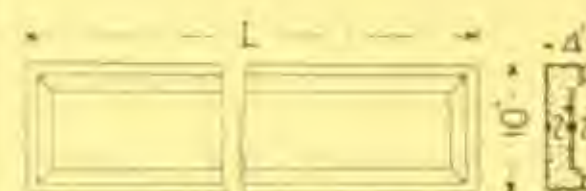
### REINFORCED CONCRETE KERB & CHANNEL.

### HUME CONCRETE PRODUCTS.

Using the same degree of care and workmanship as expended in the manufacture of Hume Concrete Pipes, a complete range of pre-cast paving and building units is also produced by the same company.

In specifying, use the following clauses:—

"All pre-cast concrete kerbing (or box crossings, or combined kerb and channel), (or building block, or wall units), (or paving slabs), shall be of Hume Pipe Company manufacture, or equal, and of the following sizes (.....), or, (as set out on plans)."



Concrete Building Block Type A

L	9	18	27	36
Wt each, lbs	18	19	40	50



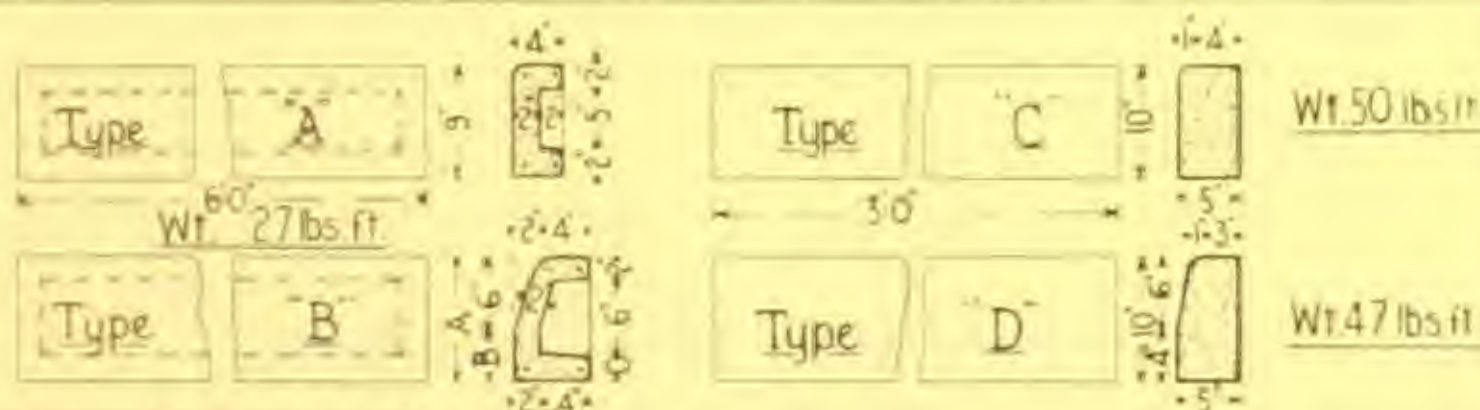
Concrete Building Block Type B

L	6	9	15	18
Wt each, lbs	14	20	34	41



Concrete Building Block Type C

L	4	4	4	4	7
Wt each, lbs	90	85	80	80	80



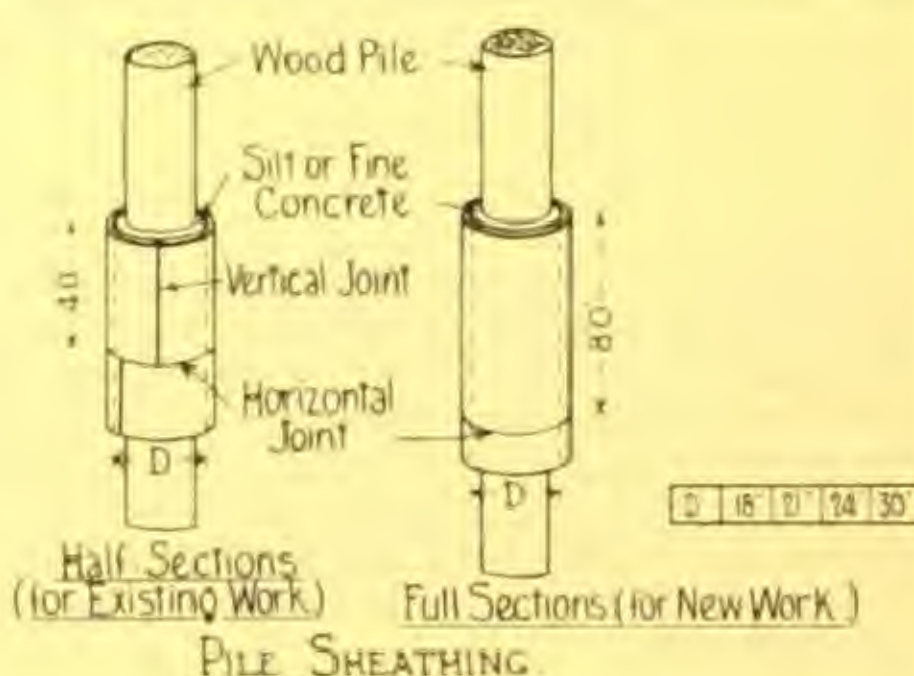
### REINFORCED CONCRETE KERBING.

Type	Size	Wt per ft. (lb)	A	B	C
B	10 x 6	34	10	4	1
C	12 x 6	38	12	6	4



### CONCRETE PAVING SLABS.

Type	L	B	D	No per sq. yd	Wt per sq. yd
A	18	9	4	8	162
B	9	9	4	16	162
C	9	4	4	32	162
D	24	24	4	2	216
E	18	18	4	3	216
F	24	18	4	4	216
G	12	12	4	9	216



Half Sections (for Existing Work) Full Sections (for New Work) PILE SHEATHING.

### SPECIAL PRE-CAST UNITS.

We shall be pleased to undertake the manufacture of any special pre-cast units, according to customers' requirements. We are specialists in compressed concrete slab manufacture, all work being done by patented machinery, giving absolutely dense concrete throughout. Slabs for drives or footpaths may be had in various colours. Prices on demand.



<p>29c</p> <p>S.A.A. File No.</p>	<h2 style="text-align: center;">STATE MONIER PIPE AND REINFORCED CONCRETE WORKS</h2> <p style="text-align: center;">[Late Gummow, Forrest &amp; Co. Ltd. Established 1897]</p> <p style="text-align: center;">HEAD OFFICE: 8-14 BOND STREET, SYDNEY</p> <p style="text-align: center;">Works: Macdonald Street, ERSKINEVILLE.</p> <p style="text-align: center;">Works: Smart Street, CARRINGTON (NEWCASTLE). Newcastle 79</p> <p style="text-align: center;">Address all enquiries to Box 3388R, G.P.O., Sydney.</p>	<h2 style="text-align: center;">SEPTIC TANKS</h2>
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Tels.—  
B3891  
B5883

[For Other Products, See Page 288]

### Product

The manufacture of Monier Portable Septic Tanks and Aerators producing the most favourable living conditions for the micro-organisms required in the septic treatment of sewage has been our aim and, judging from the great number of successful installations in use, we may well claim to have succeeded. To meet the varying requirements of our clients we manufacture installations capable of treating the sewage of households numbering from three to seventy persons, or more, if necessary.

### General Points

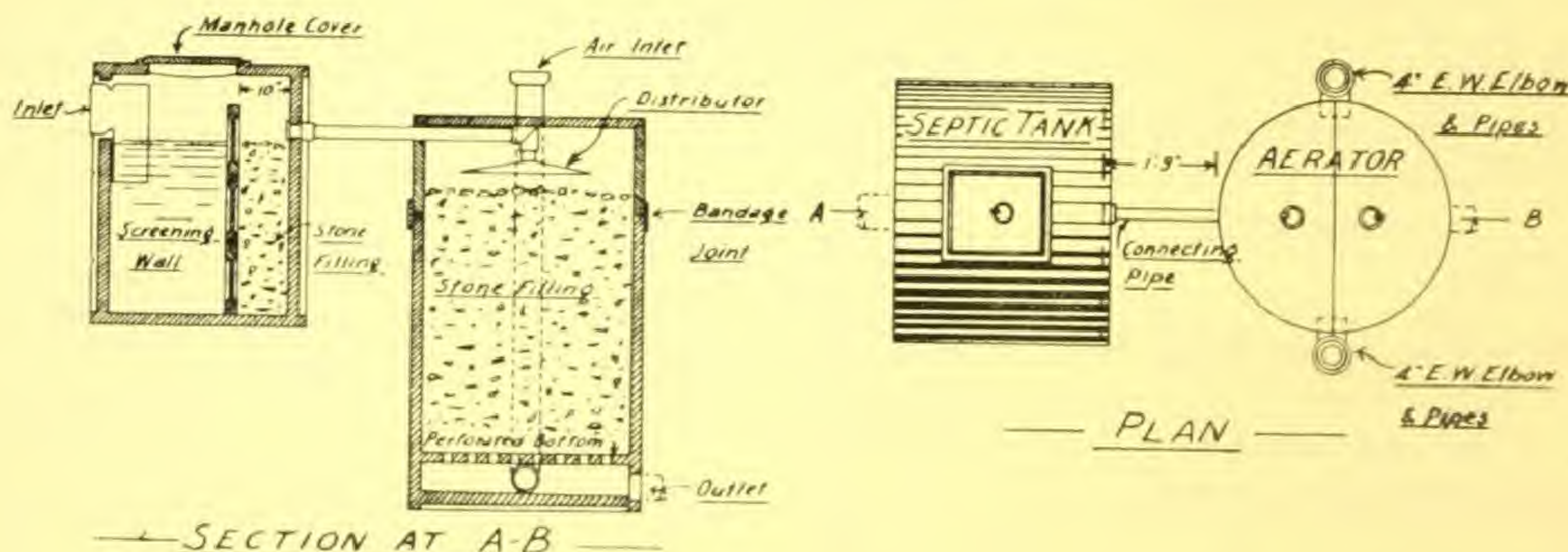
In all cases of septic installations, with or without aerators, the most suitable position compatible with local conditions must be selected to enable the discharge of the effluent in the cheapest and most favourable manner. If the ground has a slope, the installation should be arranged so as to discharge the effluent at the surface of

### Size of Installation

The capacities of our Septic Tanks are based on a water consumption of 20 gallons per head per diem, an ample provision for households.

In the case of factories where provision has only to be made for the discharge from the lavatories, a consumption of 10 to 12 gallons per head per diem is sufficient allowance, consequently the number of persons specified for each size of our Septic Tank may be increased proportionally. For satisfactory working, the contents of tank should be completely changed in a period of from 12 to 48 hours.

It is advisable to adopt size of tank to meet usual requirements, especially as the provision of 20 gallons per head per diem for our Septic Tanks permits of a temporary increase in the number of persons from 10 to 20 per cent. without detrimental effect. Our Stock Aerators are 6 ft. 5 in. high overall, giving a depth of filter bed of 4 ft. 6 in. They are supplied in two sections, necessitating a bandage joint.



the ground so that it may run into surface drains to soak into the soil or to be used for irrigation purposes. If the ground be flat the installation must necessarily be underground, and the effluent must be discharged into underground drains of rubble or perforated pipes to soak into the subsoil or to be collected into a tank, if required for irrigation purposes, in which case the liquid will have to be lifted by mechanical means to the surface of the ground.

As the micro-organisms subsist on the sewage, it is apparent that the latter must contain the necessary substance for their well-being, and to ensure the proper working of the installation, the discharge of the W.C., the house and kitchen slops, bath and laundry water, should all pass through same. A too concentrated or too diluted sewage are alike unsuitable.

Disinfectant must be strictly excluded. Only sanitary paper should be used in the W.C.

### Permits for Septic Tank Installations

In order to safeguard the interests of the general public, the local authorities have been entrusted with the supervision of private biological treatment works. It is, therefore, necessary to make application to the respective Municipal or Shire Councils or other authorities for permission to make such installations, and submit designs and particulars for their approval.

To assist our clients in this matter, we forward on application, free of charge, the necessary drawings and particulars of our Stock Installations with and without Aerators, to accompany their application for Septic Installation.

(Continued on next page)



### Specification of Materials Used in Connection with a Septic Installation

The stone filling in Septic Tank and Aerator should consist of clean, hard, broken stone, of a gauge not less than  $2\frac{1}{2}$  in. The cement grout to be a mixture of cement and water.

The cement mortar to be composed of one part of cement to two parts of clean, sharp sand.

The concrete to be composed of one part of cement, two parts of sand and three and a half parts of  $\frac{3}{4}$  in. to 1 in. gauge broken stone or gravel.

### Materials Supplied

With each Septic Tank, irrespective of size or number of sections, we supply Screening Wall, Manhole Cover, and E.W. Inlet Junction.

With each Aerator we supply Reinforced Concrete Cover Plate in two sections, G.I. Connecting Pipes, G.I. Distributor, Induct Piping, with two E.W. Elbows for same, and two Gratings for Induct Pipes.

### SIZES AND CAPACITIES OF STOCK SEPTIC INSTALLATIONS

No. of Persons to be Served.	Allowance per head per diem in Gallons.	Number of Septic Tanks.	Diameter of Septic Tanks.	No. of Sections 3ft. 7in. long per Septic Tank.	Length of Septic Chamber per Tank.	Capacity in Gallons.	Number of Aerators.	Diameter of Aerators.	Total Area of Aerating Bed.	Depth of Aerating Bed.
			ft. in.		ft. in.			ft. in.	sq. yds.	ft. in.
3	20	1	3 0	1	3 0	64	1	3 6	1.07	4 6
5	20	1	3 6	1	3 0	96	1	3 6	1.07	4 6
6	20	1	4 0	1	3 0	128	1	3 6	1.07	4 6
8	20	1	4 6	1	3 0	160	1	3 6	1.07	4 6
13	20	1	3 6	2	6 7	256	2	3 6	2.14	4 6
17	20	1	4 0	2	6 7	352	2	3 6	2.14	4 6
23	20	1	4 6	2	6 7	464	2	3 6	2.14	4 6
29	20	1	4 0	3	10 2	576	3	3 6	3.21	4 6
35	20	1	4 6	3	10 2	704	3	3 6	3.21	4 6
46	20	2	4 6	2	6 7	928	4	3 6	4.28	4 6
57	20	2	4 0	3	10 2	1,152	6	3 6	6.42	4 6
70	20	2	4 6	3	10 2	1,408	6	3 6	6.42	4 6

### Erection

The erection of Septic Tanks and Aerators as supplied by us can easily be done by any intelligent workman with the help of the drawings we supply, but, as a licensed plumber is necessary for the house connections, etc., it is as well to have the whole work carried out by him.

### Freights

On N.S.W. Government Railways.—Under one ton, first class rates; one ton and under six tons, "C" class rates; in six-ton lots per four-wheeled truck, "B" class rates.

By Coastal and Interstate Boats.—Rate per 40 cubic feet, or dead-weight, whichever be most favourable to shipping company.

### MONIER SEPTIC TANKS

Number of Persons	Number of Septic Tanks.	Number of Sections 3ft. 7in. long in each Septic Tank.	Diameter of Septic Tanks.	Weights by Rail.		Weights by Boat.	
				Approximate Weight per Septic Installation with Accessories.	Approximate Weight per Septic Installation with Accessories.	Approximate Cubic Tonnage per Septic Installation with Accessories.	Approximate Cubic Tonnage per Septic Installation with Accessories.
			ft. in.	tons cwt. qrs.		Cubic Tons	
3	1	1	3 0	0 12 1		1.0	
5	1	1	3 6	0 16 0		1.3	
6	1	1	4 0	0 19 2		1.6	
8	1	1	4 6	1 5 1		2.0	
13	1	2	3 6	1 6 0		2.4	
17	1	2	4 0	1 11 2		3.0	
23	1	2	4 6	1 19 1		3.8	
29	1	3	4 0	2 3 1		4.5	
35	1	3	4 6	2 13 1		5.5	
46	2	2	4 6	3 18 2		7.5	
57	2	3	4 0	4 6 2		8.9	
70	2	3	4 6	5 6 2		10.0	

### MONIER AERATORS

Number of Aerators.	Depth of Aerator Bed.	Weights by Rail.		Weights by Boat.	
		Approximate Weight per Aerator and Accessories.	Approximate Weight per Aerator and Accessories.	Approximate Cubic Tonnage per Aerator and Accessories.	Approximate Cubic Tonnage per Aerator and Accessories.
	ft. in.	tons. cwt. qrs.		Cubic Tons.	
1	4 6	1 7 2		2.5	
2	4 6	2 15 0		5.0	
3	4 6	4 2 2		7.5	
4	4 6	5 10 0		10.0	
6	4 6	8 5 0		15.0	



<div>29c</div> <div>S.A.A. File No.</div>	<div>KAUSTINE PTY. LTD.</div> <div>Sanitation Engineers</div> <div>Office and Factory:</div> <div>259 BURWOOD ROAD, HAWTHORN, VICTORIA</div>	<div>SEPTIC TANKS</div>
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### Products

Patent Hygeo Super Septic Tank; Kaustine Patent Chemical Sewerage Systems; Bitumastic Paint; Plumbers' Jointing Compound; Kaustine Chemical.

### Hygeo Super Septic Tanks

Where sufficient water is available, soil conditions are suitable and sufficient ground available, the septic tank proves the ideal sewage disposal system for unsewered areas. To provide a cheap, ready-made tank, which is easily transportable, the Hygeo Super Septic Tank was designed.

### How a Septic Tank Operates

The action in a septic tank consists of two processes. One: Settling out of the solids; the heavier settling to the bottom and the lighter rising to the surface. The other: The biological and bacterial action whereby the solid matter settled out undergoes a change from a solid into its component parts of liquid and gas. This latter action is known as septic action.

This bacterial action, known as a process of disintegration, is brought about by the bacteria working in the absence of air. This is anaerobic decomposition. During this process of breaking down the more complex organic matter into simpler forms, gas is formed, and the gas bubbles rising to the surface carry with them the particles of solid matter which add to the amount of solids forming the floating scum. This scum is necessary for the exclusion of air and light. On account of this bacterial action in the solid matter at the bottom of the tank, not only is the character changed, but its volume also is reduced. Years pass before the amount accumulated at the bottom of the tank is sufficient to interfere with the proper clarification of the sewage.

### Hygeo Septic Tank Design

Owing to the peculiar patented design of the baffles of the Hygeo Super Septic Tank, the flow of sewage, as shown in the accompanying illustrations, follows the circumference of the tank, making it traverse approximately three times the distance it does in other septic tanks of similar capacity. This slow but positive movement through the tank ensures a very efficient septic action, giving more complete liquefaction, less sludge, and a clearer and more easily assimilated effluent.

### Manufacture

Hygeo Super Septic Tanks are manufactured of heavy gauge rust-resisting iron, and treated internally and externally with a bitumastic anti-corrosive coating applied by immersing the tank in the boiling bitumen compound. The cover of the tank is bolted down over a water-tight gasket, and is fitted with an inspection opening over the inlet baffle. This inspection cover is readily removed by lifting a spring clamp. Particulars as to capacities of tanks are given on the table in opposite column.

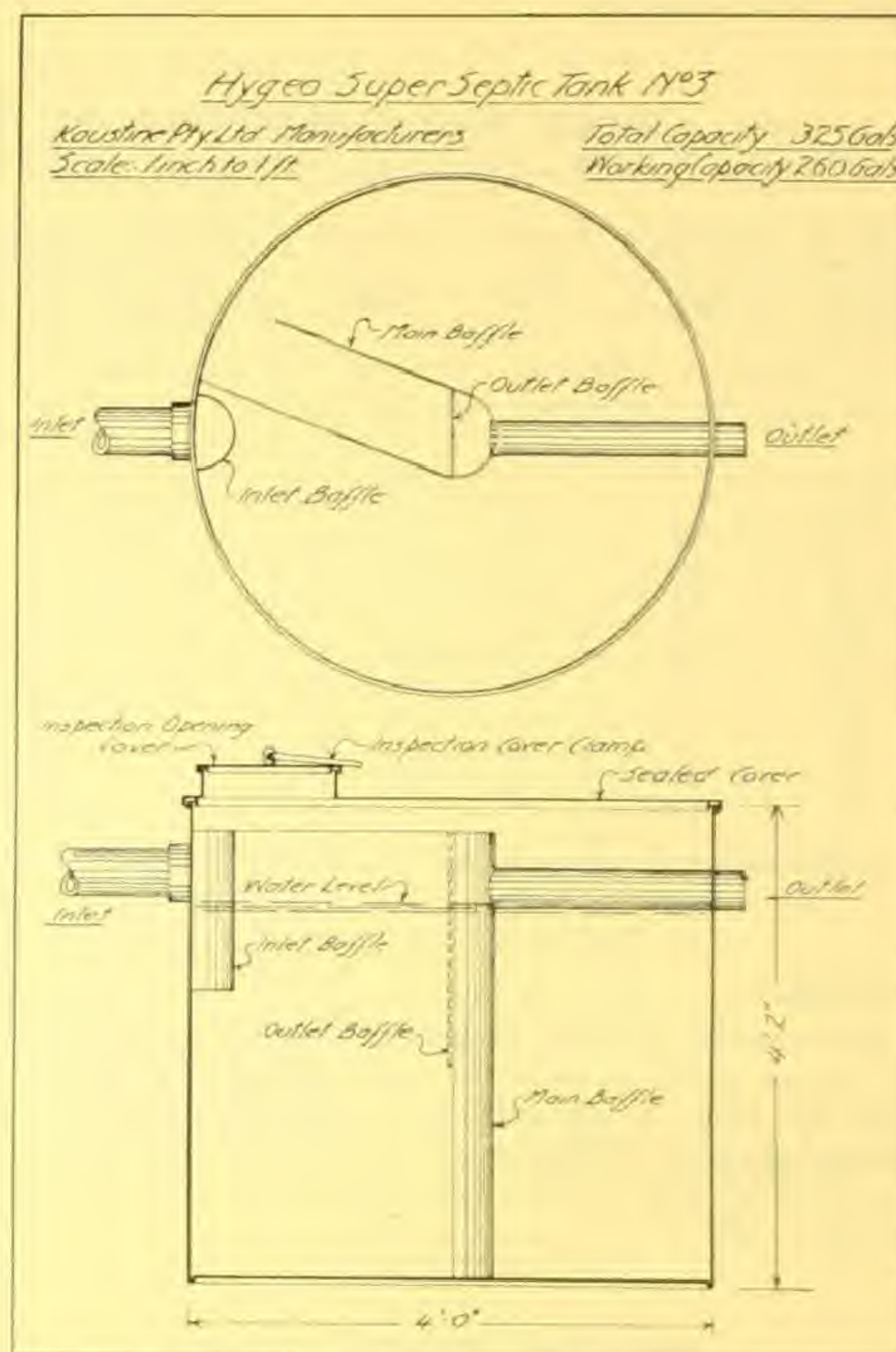


Table of Standard Sizes

Size.	Diameter.	Depth.	Total Capacity.	Working Capacity.	Maximum No. of Persons.
No. 1	30 in.	39 in.	100 gls.	75 gls.	8
No. 2	38 in.	50 in.	205 gls.	164 gls.	15
No. 3	48 in.	50 in.	325 gls.	260 gls.	25
No. 4	54 in.	60 in.	500 gls.	400 gls.	40

### Prominent Installations (In Victoria)

Melbourne General Cemetery, Fawkner.  
St. Margaret's School, Berwick.  
Sir Stanley Argyle, Mystic Park.  
C. M. M. Dare, Architect, Frankston.  
E. P. Ackman, Esq., Frankston.  
Dr. W. A. H. Birrell, Cheltenham.  
Harold Alston, Esq., Diamond Creek.

(Continued on next page.)



### Effluent Disposal

As septic tank treatment does not effect a complete purification of the sewage, some additional means, such as absorption or oxidation, must be provided for the final disposal. This is most effectively disposed of by series of agricultural pipe drains laid in metal. The length of drain varies in accordance with the porosity of the subsoil. Each installation must be treated individually, and no hard and fast rules can be laid down for the amount or arrangement of the effluent drain.

### Automatic Syphon

In very clayey country difficulty is experienced with the disposal of the effluent. This may be overcome by using an automatic syphon in conjunction with the septic tank.

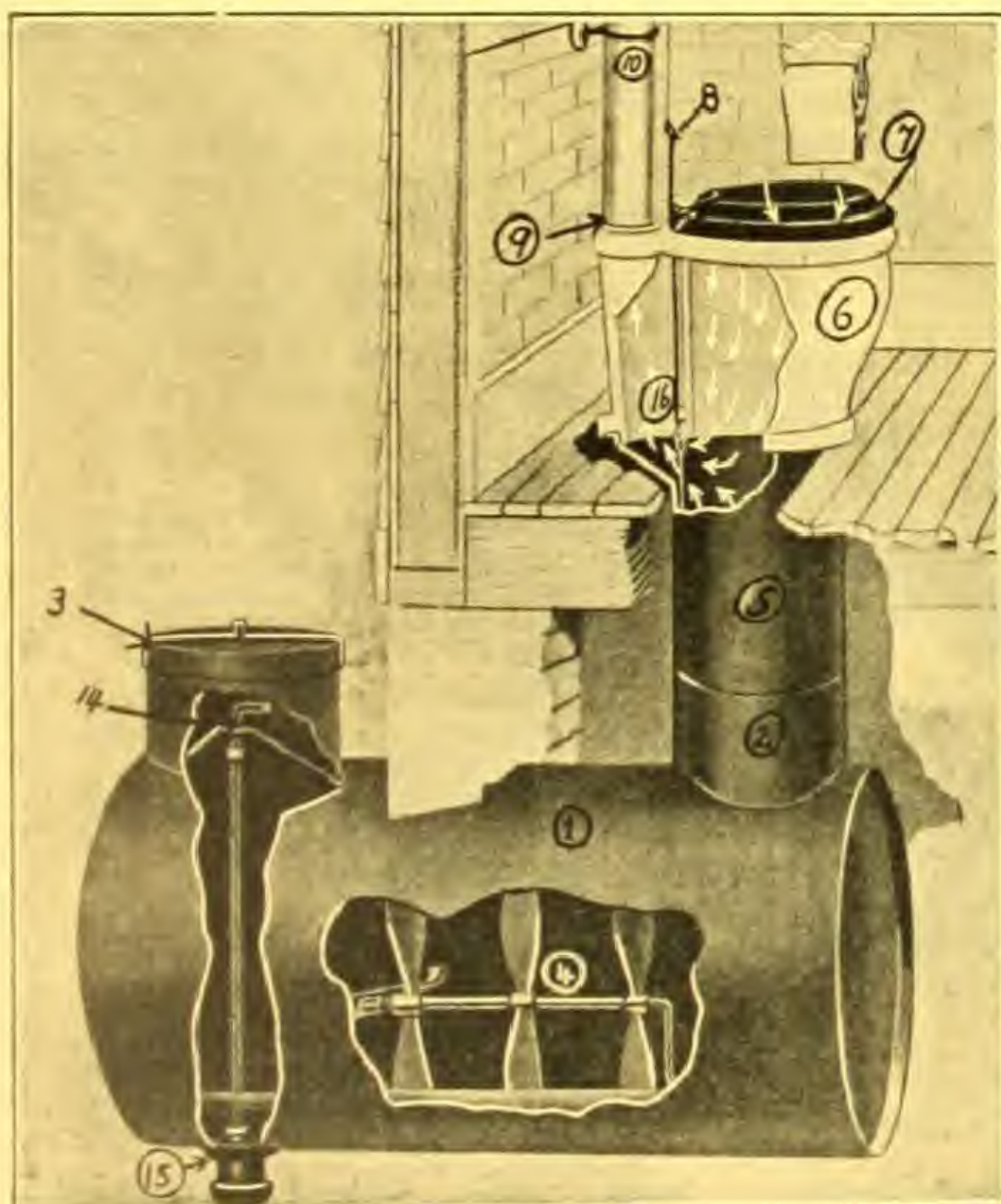
The purpose of the automatic syphon is to receive and retain the effluent from the septic tank until the chamber of which the syphon is a part becomes full. By an entirely automatic action the syphon then discharges the contents of the chamber into the absorption beds. Where the soil is heavy the absorption beds are given an opportunity to rest and dry out between dosing.



Illustrating Automatic Syphon

## KAUSTINE CHEMICAL SEWERAGE SYSTEMS

The Kaustine Standard Equipment is a chemical sewerage system for unsewered areas, particularly where water is not available, or where local conditions make the installation of a septic tank impracticable.



### Description

A special pan is fixed directly over an underground tank. This allows all faecal matter to drop through. In

the tank is a charge of Kaustine Chemical, the action of which breaks down all solid matter into liquid form, and generally sterilises it. This liquid is conserved in the tank until it becomes full. The tank then has to be emptied by one of the methods later referred to.

Internally the tank is fitted with a series of propellers or agitators operated by a handle behind the seat. By working the handle up and down after use the agitators are rotated, thus mixing the contents of the tank and assisting the chemical action.

### Manufacture

The tank is manufactured out of heavy gauge special rust-resisting iron, oxy-welded together. A bitumastic anti-corrosive coating is applied by completely immersing the tank in a well of the bitumastic compound at a temperature of over 400 deg. Fahrenheit. The pan is white porcelain. Packed for despatch the system is complete with tank, pan, seat, vent pipe, all necessary small fittings, and the first charge of chemical.

### Advantages

The Kaustine chemical system provides a complete sewerage system, giving the same comfort and convenience experienced in the sewered areas. It may be installed in close proximity to the house, on the back verandah, or, if properly air-locked, inside the house.

### Prominent Installations

Melbourne and Metropolitan Board of Works.  
Commonwealth Department of Works.  
Melbourne and Metropolitan Tramways Board.  
H. V. McKay Pty. Ltd.  
Nauru Administration.  
Broken Hill Pty. Co. Ltd.

### Installation

The accompanying line drawings give the dimensions of the standard tanks for installation in timber and brick buildings. They also show the relation of the tank to floor line and walls of building. The height of the manhole sleeve varies in accordance with the height of floor line above ground level, and is shown on the illustration overleaf.

(Continued on next page)



### Emptying—Methods of Disposal

Where soil is of an absorbent nature effluent may be disposed of by allowing it to drain away through 4-in. stoneware drain to wooden disposal box or soak well in the ground. If soil is not suitable, effluent will have to be pumped out and removed for disposal. In a normal household of five or six people, the equipment requires emptying approximately once every six months.

### Multiple Installation

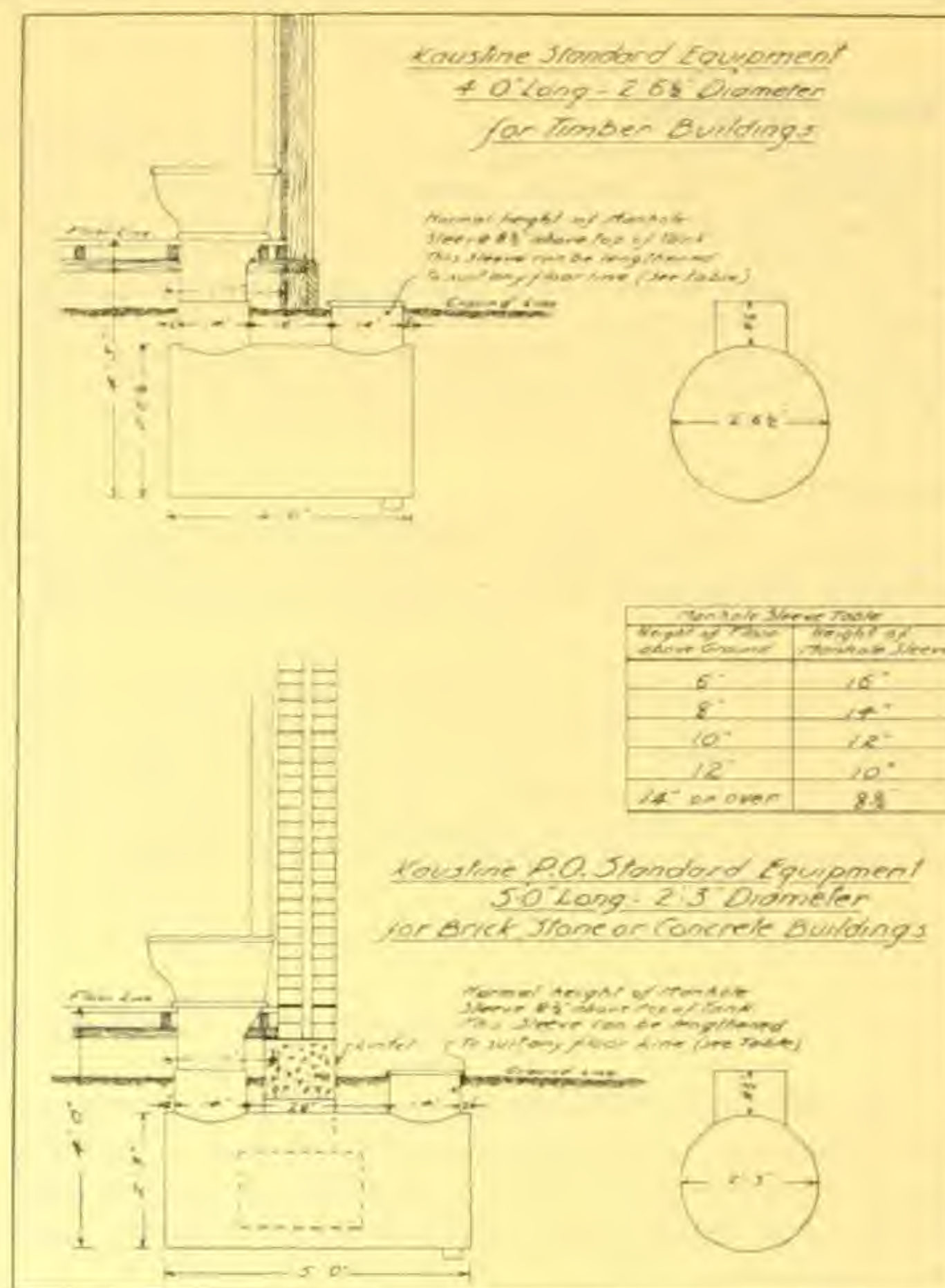
Where two or more seats are to be installed alongside one another, special multiple tanks are manufactured for the purpose, particulars of which may be had on application to the Company.

### Urinals

Special vented and hooded Kaustine urinals are manufactured. The wastes from these connect to the Kaustine tanks where required.

### Week-end Installations

A smaller type of Kaustine Sewerage System, known as the Kaustine "Junior" Equipment, is manufactured for small cottage installations, week-end residences, etc. Particulars will be forwarded on application.



## SPECIFICATION OUTLINE FOR WATER SUPPLY AND SEWERAGE

(Prepared by the Architectural Staff of Ramsay's Catalogue)

### MATERIALS.

- W.I. Piping.
- Copper Piping.
- Cast-Iron Piping.
- Drain Pipes—
  - (b) Cast-Iron.
  - (c) Stoneware.
- Lead.
- Valves—
  - (a) Bib Taps.
  - (b) Pillar Taps.
  - (c) Stop Cocks.
  - (d) Ball Cocks.
  - (e) Mixing Valves.
- Specify desired finish and style to taps of certain rooms.
- Flush Valves.
- Cisterns.
- Pedestal Pans.
- Toilet Seats.
- P.C. Item Schedule of Fittings.

Suggested heading:—

Compartment	Item	Cost

### WATER SUPPLY.

#### General.

Note.—Specify that all fees shall be paid as required and that all work shall be carried out in accordance with the rules and regulations of the \*.....

#### Connections and Tappings.

- (a) Note.—Include clause stating that permission for opening up roadway for making connection with the house service and the water main must be secured from the \*.....

#### (b) Connection between House Service and Main.

Note.—Include size and material of piping of house connection with main, and after referring to local regulations, state the specific form of tapping that is necessary.

- (c) Stop Cocks and their location.
- (d) Joints.
- (e) Restoration and making good of road surface.

#### Meter and Its Location.

House Service.  
Note.—Specify the desired service from the meter to the various points and fixtures in the building, indicating the size of branches and the size and type of taps required. The later requirements can be best explained in schedule form, under a heading similar to that suggested below.

#### Schedule of Points.

Room or Location	Fixture or Point.	Size and Type of Tap.

### SEWER SYSTEM.

#### General.

Note.—(a) That all work shall be carried out in accordance with the rules of the \*..... and under the supervision of their inspector.

- (b) That the contractor shall pay all necessary fees and secure the consent of the \*.....
- (c) That the final certificate shall not be made until the certificate of the \*..... is produced certifying that the

work has been satisfactorily carried out.

#### Connection to Sewer.

- (a) Note.—State position on site where connection is to be made to the sewer or branch of the \*.....
- (b) Boundary Trap.
- (c) Manhole (if necessary).
- (d) Inlet Vent.

#### External Drainage.

- (a) Drain Pipes.  
State size and whether stoneware or C.I. is to be used. Specify all necessary inlets, bends, inspection openings, etc.
- (b) Traps—Gulleys, Disconnectors.
- (c) Vents.  
(1) Boundary Trap Vent.  
(2) Branch Line Vents (if necessary).
- (3) Educt Vents.

### INTERNAL PLUMBING.

- (a) Soil Stacks.
- (b) Wastes.
- (c) Traps to Fixtures.
- (d) Vents.
- (e) W.C. Pan Flushing.  
Specify size, location, and type of storage tank for flushing purposes; also service from tanks to the flusher. Specify which pans are to have flush valves or cisterns.
- (f) Overflow Pipes.
- (g) Lead Saps.
- (h) Floor Gratings.
- (i) Exposed Piping.  
Specify desired finish.

Note.—\* The local body having jurisdiction over this work.





# GEO. W. KELLY & LEWIS PTY. LTD.

Engineers

Office:  
COLLINS HOUSE, 360 COLLINS STREET,  
MELBOURNE.

Works:  
SPRINGVALE, VICTORIA.

Sole Representatives:

N.S.W.: Alfred Snashall Ltd., 85 Pitt Street,  
Sydney.

S.A.: E. Treliving, T.T. Buildings, Light  
Square, Adelaide.

QUEENSLAND: Waugh & Josephson Ltd.,  
102-104 Melbourne St., South Brisbane.

W.A.: Atkins (W.A.) Ltd., 894 Hay Street,  
Perth.

29d

S.A.A. File No.

[For Other Products, See Pages 113 and 493]

## Products

Standard belt and motor driven Centrifugal Pumps, types N, L and H; split casing double suction belt and motor driven Centrifugal Pumps; solid casing double suction belt and motor driven Centrifugal Pumps; split casing single suction multi-stage Centrifugal Pumps; split casing turbine multi-stage Centrifugal Pumps; solid casing turbine multi-stage Centrifugal Pumps; vertical Centrifugal Pumps, horizontal and vertical plunger pumps.

## Centrifugal Pumps—Construction and Operation

The latest developments in "K.L." Centrifugal Pumps, the standard motor driven type being illustrated below, have enabled the incorporation of many special features in both design and construction, these having been brought about by scientific research over a period covering the last few years, the benefits of which are now offered by the "K.L." Pump Department to clients.

All mechanical details have been thoroughly attended to, hydraulic and running balance receiving special care. The casing design is of interest, inasmuch that strength, efficiency, compactness and pleasing appearance have been successfully combined. A valuable feature which appeals to the user is the ease with which "K.L." Pumps may be taken apart for inspection and maintenance.

### MANUFACTURERS' SPECIFICATION—TYPES L & H

**Casing.**—The casing, of the volute type covered by Letters Patent for the latest improvements in volute design, is of high-grade cast-iron and is secured to the bedplate by a swivelling trunnion allowing casing to be swivelled to any position to suit pipe connection. The suction cover is strongly ribbed and secured to casing by bolts passing through heavy lugs on casing. The flange connection allows the suction pipe to be

**Bedplate.**—The one-piece cast-iron bedplate is of substantial design machined to carry pump housing and motor and provided with drains and screwed connections for piping away leakage from the stuffing box.

**Bearings.**—A ring-oiler type bearing of ample proportions is fitted, having a large oil capacity. The bearing is of high-pressure, die-cast white metal, which has much greater strength and longer life than babbit metal or bronze. A large hinged inspection lid and plug for cleaning is fitted.

**Spindle.**—The spindle is of steel, accurately machined. The impeller is secured by means of a key and screwed locknuts.

**Thrust.**—A double-purpose heavy duty ball thrust bearing is fitted, held in an oil-tight housing.

**Flexible Coupling.**—A "K.L." disc type flexible coupling accurately bored and keyed to suit motor spindle is fitted.

**Materials.**—The materials used in the construction of these pumps are the best of their respective kinds, all parts being subjected to rigid inspection and tests before leaving the works. The guarantee of all "K.L." Pumps covers workmanship, materials and duty.

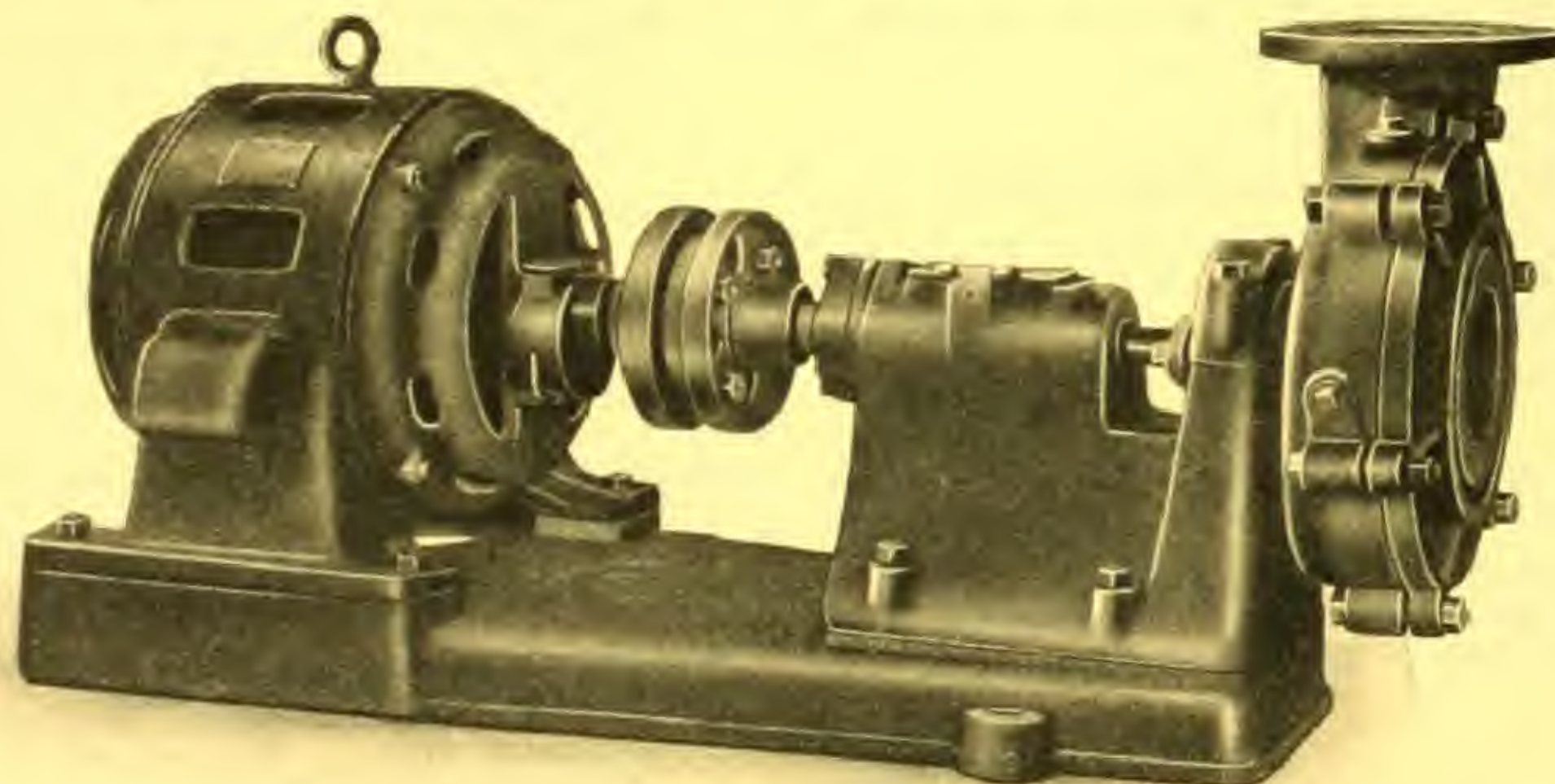
**Interchangeability.**—All parts are manufactured to fine limits and are carefully inspected and checked before assembly, thus insuring accurate fitting of replacement parts.

**Special Materials.**—These pumps can be made in special metals to suit special conditions.

**Belt-Driven Pumps.**—Fast and loose pulleys of ample proportions can be supplied for belt driving.

## Course of the Water

Water enters the pump through the suction connection and is guided in a solid stream to the inlet of the impeller. The vanes of the impeller give the water a whirling motion and so, by the centrifugal force produced, the water is thrown out into the volute shaped casing which is designed to reduce the velocity of the water in such a manner as to convert the velocity energy produced by the impeller to pressure energy. The volute then leads the water to the discharge connection.



Standard Motor-Driven Pump, Types L and H.

rotated to any position independently of the casing. When the suction cover is removed, a clear opening to whole of casing is provided.

**Impeller.**—The Impeller is of the shrouded, single suction type, provided with balancing chamber to equalise end thrust.

**Stuffing Box.**—The Stuffing Box is of ample size and fitted with die-cast Brollum gland and packed to suit the nature of the operating conditions.

## Facilities for Manufacture

The "K.L." Pump Department comprises drawing and design office, machine shops and a testing department, where pump duties are checked and developmental work carried out.

(Continued on next page)



CAPACITY TABLE FOR "K. &amp; L." TYPE "L" CENTRIFUGAL PUMPS.

Pump Size, Inches.	Head.		Gallons per Minute.		Approx. Floor Space—Inches.	
	Minimum.	Maximum.	Minimum.	Maximum.	Length.	Breadth.
1	15	40	5	20	2 ft. 6 in.	12½ in.
1½	15	60	25	45	2 ft. 6 in.	12½ in.
2	15	60	55	95	3 ft. 0 in.	13 in.
2½	15	60	105	145	3 ft. 6 in.	16 in.
3	15	60	165	225	3 ft. 6 in.	16 in.
4	20	100	250	350	3 ft. 7 in.	17 in.

CAPACITY TABLE FOR "K. &amp; L." TYPE "H" CENTRIFUGAL PUMPS.

Pump Size, Inches.	Head.		Gallons per Minute.		Approx. Floor Space—Inches.	
	Minimum.	Maximum.	Minimum.	Maximum.	Length.	Breadth.
1	20	100	5	20	3 ft. 0 in.	13 in.
1½	20	100	25	45	3 ft. 6 in.	16 in.
2	20	100	55	95	3 ft. 6 in.	16 in.
2½	20	100	105	145	3 ft. 6 in.	16 in.
3	20	100	165	225	3 ft. 7 in.	17 in.
4	20	100	250	350	4 ft. 3 in.	20 in.

NOTE.—Floor space given is for Direct Coupled Motor-Driven Type.

### Data Required for Estimates

It is essential, in order that we may furnish the most serviceable equipment, that the following information be furnished when asking for recommendations and prices:—

1. For what purpose the pump is to be used?
2. Quantity of liquid to be pumped per minute?
3. Character of the fluids—salt, fresh, clean or dirty, hot?
4. If solid matter is contained, state size and character of largest pieces.
5. Is the service steady or intermittent?
6. Total head in feet to be pumped against?
7. Suction lift in feet?
8. Pressure on suction, if any?
9. Length and diameter of suction pipe and number of turns?
10. Length and diameter of delivery pipe and number of turns?
11. Character of driving power? If electric, state voltage and kind of current, i.e., whether direct or alternating, and if the latter, what cycle and phase.

### Engineering Designing Services

In order to give prompt and reliable service to purchasers of pumping equipment, Geo. W. Kelly & Lewis Pty. Ltd. maintain a staff of competent and experienced engineers at their designing department, and also have representatives in capitals of the principal Australian States and New Zealand.

These representatives are prepared to give efficient service to users of "K.L." Pumps, and to assist pro-

pective purchasers by making recommendations as to proper equipment for individual requirements, and will give information as to standard sizes, capacities, speeds, powers, efficiencies, etc.

### Permissible Suction Lift

The following table gives the permissible suction lift of centrifugal pumps when handling water at various temperatures:—

Temperature of Degrees F. Water.	Permissible Suction Lift—Feet.	Head required on Suction—Feet.
Below 70	21	
90	19	
110	15	
130	10	
150	5	
170	0	
190		7
210		12

### ARCHITECT'S SPECIFICATION OF SINGLE-STAGE CENTRIFUGAL PUMP INSTALLATION.

**PUMP.**—Supply and install on concrete foundation by others where indicated on plan..... Kelly and Lewis type..... Direct-Coupled Motor-Driven Pump, having a capacity of..... gals. per min. against a total head of..... ft. suction and discharge branches..... diameter. Pump shall be equipped with balanced impeller keyed and held against a shoulder on the spindle by screwed lock-nuts. Bearings to be of ring-oiled type, with white-metal lining, the whole to be mounted on a heavy cast-iron subbase and direct-coupled to motor by a flexible coupling.

**MOTOR.**—Motor to be of approved manufacture..... horse-power..... volts..... current, operating at a speed of..... rev. per min., capable of running without undue heating, sparking or sign of overload.



### Centrifugal Pumps—Uses and Power Application

General water service, hot water supply, boiler feed service, heating systems, air washing, fire protection, refrigeration, sump pumping, sewerage. "K.L." Pumps can be adapted for direct coupling to electric motors, steam, gas or internal combustion engines, or can be arranged for belt driving to same.

### Types L & H Centrifugal Single-Stage Pumps

These pumps are designed for hard service with a minimum of attention, being of a rugged design, and combining efficiency with neat appearance. Special features are: (1) Large bearings, having large oil reservoirs; (2) Swivelling casing to allow connection to suction and discharge piping in any position.

### Multi-Stage Pumps

Where the head to be pumped against is greater than Single Stage, Type H, can handle, a multi-stage pump should be used.

These pumps are designed so that they can be built up by increasing the number of stages to pump against high heads. They can be arranged for either belt driven or for direct coupling to any type of power unit.

### Vertical Centrifugal Pumps

This type of pump, as illustrated on this page, is used for pumping from a deep sump or well where the suction lift would be too great if the pump and motor were mounted together at the surface level. Also, if the pump is working intermittently, as may be the case of draining a sump, the pump is always primed, i.e., full of water, and so obviates the necessity for having a foot-valve on the suction pipe or any automatic priming device which would otherwise be required.

A float-operated switch can be used with this type of pump to start and stop the motor automatically when the liquid reaches certain definite predetermined levels.

### Other Types of Pumps

The "K.L." three-throw single-acting hydraulic pump is manufactured for supplying liquids at high pressure and is especially suited to handling viscous liquids such as heavy oils, molasses, etc., and for supplying hydraulic power for lifts, presses, etc.

The "K.L." split casing type of pump, in which the casing is split and flanged along the axis of the pump, has the advantage that when space around the pump is limited, by lifting the cover the whole of the spindle assembly, including impellers, glands, and neck-bushes, are exposed for attention.

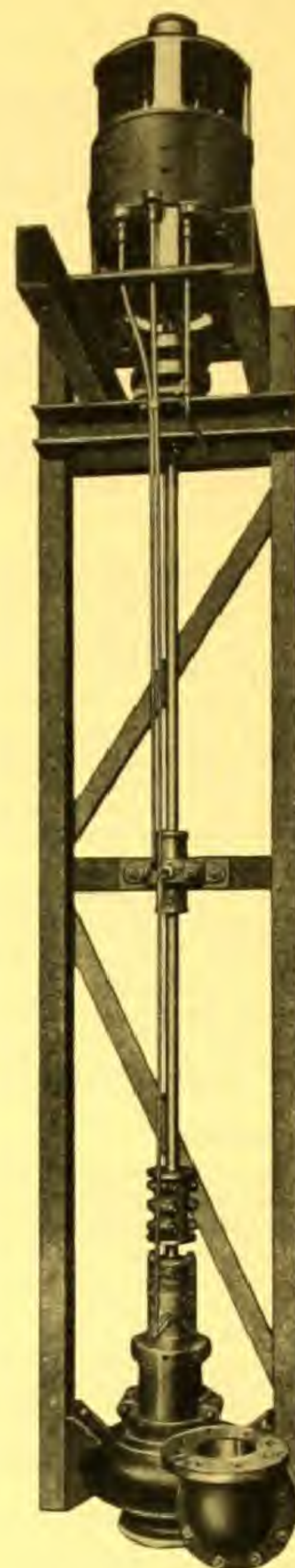
#### LIST OF REPRESENTATIVE INSTALLATIONS

##### MELBOURNE:

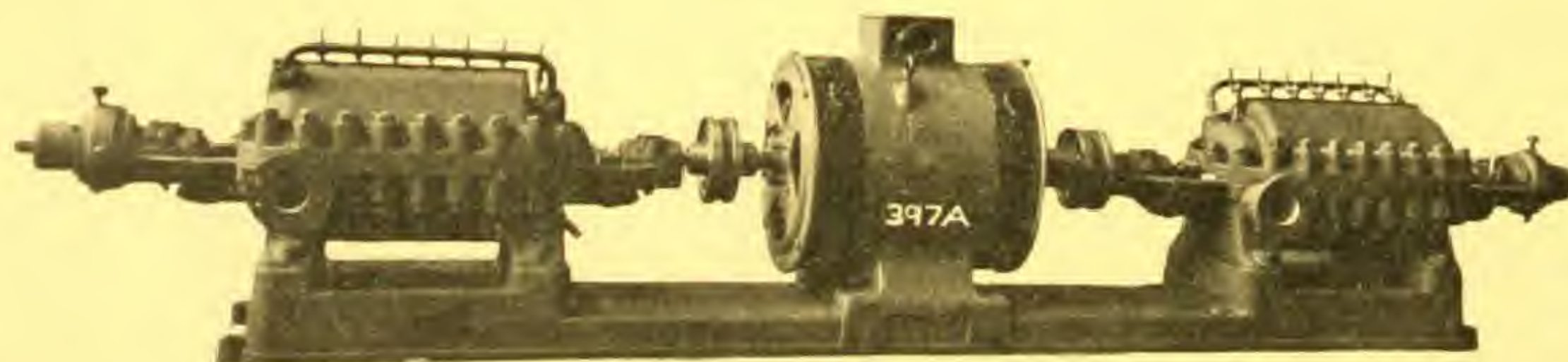
New A.M.P. Building, Collins Street.  
Hotel Alexander.  
Howey Court.  
G. J. Coles & Co.  
Taxation Offices.  
Arts Block, University of Melbourne.  
Melbourne Public Library.  
Queen Victoria Hospital.  
Austin Hospital.

##### SYDNEY:

N.S.W. Government Savings Bank.  
Farmers' Ltd.  
Hotel Australia.  
B.M.A. Building.  
Stanton House.  
Morris Hotel.  
David Jones Ltd.  
Lewisham Hospital.  
Colonial Mutual.



Vertical Centrifugal  
Pump with Steel  
Frame.



Multi-Stage High Lift Centrifugal Pump.



# A. E. ATHERTON & SONS PTY. LTD.

383 LATROBE STREET, MELBOURNE, VICTORIA

29h

S.A.A. File No.

MANUFACTURERS OF "ATHENA" MIXERS, FLUSH VALVES AND COMPRESSION FITTINGS, CENTRIFUGAL PUMPS AND ENGINEERS' BRASSWARE



"ATHENA"  
Trade Mark

[For Other Products, See Pages 340 and 472]

## The "Athena" Mixing Valve

The "Athena" Valve mixes hot and cold water and discharges warm water at any desired degree of temperature. It is anti-scalding, and is able to maintain a constant delivery temperature regardless of fluctuating pressures in the supply lines.

## Features of Design & Construction

- (1) The "Athena" mixer is ruggedly built of non-corrosive metals. It is of simple construction, with few working parts, consisting of a brass casting for the mixing chamber, a cam and two cartridge valves with rubber seatings. The rubber is the only wearing part, and can be replaced by the owner at a very small cost. There are no diaphragms nor thermostatic coils used.
- (2) Any desired degree between the cold water and hot water supplies can be obtained at a touch, the cam operation being very light and positive.
- (3) Accessibility to working parts is easily accomplished by removing the front plate. The only tool necessary for this purpose is an ordinary screwdriver.
- (4) Dials and handles are heavily nickel-plated.

## Operation

The cam is brought into operation by turning the handle to the right (Note: It will only move in this direction so as to prevent scalding if handle was first turned through "hot" position), which opens the "cold" valve and allows the cold water to enter mixing chamber. Moving the handle to the "mixed" position, the cam opens the "hot" valve, and while still retaining the open position of the "cold" valve, allows the hot and cold water to be mixed before delivery is made to shower or bath. If a higher temperature is required, move the handle to the "hot" position and the cam will then gently slide off the "cold" valve and allow the full discharge of hot water.

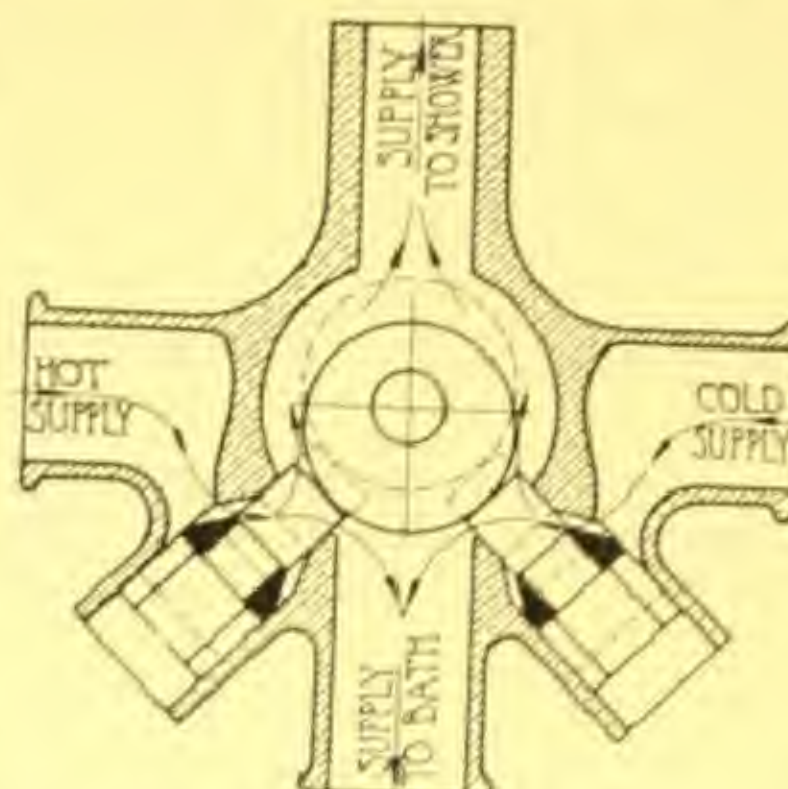


Diagram Showing the Principle of the "Athena."

## Models

"Athena" Valves are available in exposed or concealed models suitable for 1/2 in., 3/4 in. and 1 in. pipe connections, and adaptable to either bath or shower installations or as a combined supply to both.

## Concealed

This model is for concealed piping. It is fitted with a nickel-plated cover piece and handle, which is designed so that it can be extended 12 in. or further through the walls.

## Exposed

This model for exposed piping, has all exposed parts nickel-plated, and is obtainable with either circular or octagonal dials.

## ARCHITECT'S SPECIFICATION

**MIXER.**—Provide and install where shown on plans, an "Athena" mixing valve as manufactured by A. E. Atherton & Sons, Melbourne. The mixer shall be (a) concealed type, (b) exposed type, with nickel-plated dials and handles.

**Note.**—State if "b" is to have circular or octagonal dial. When ordering concealed models, state thickness of walls.

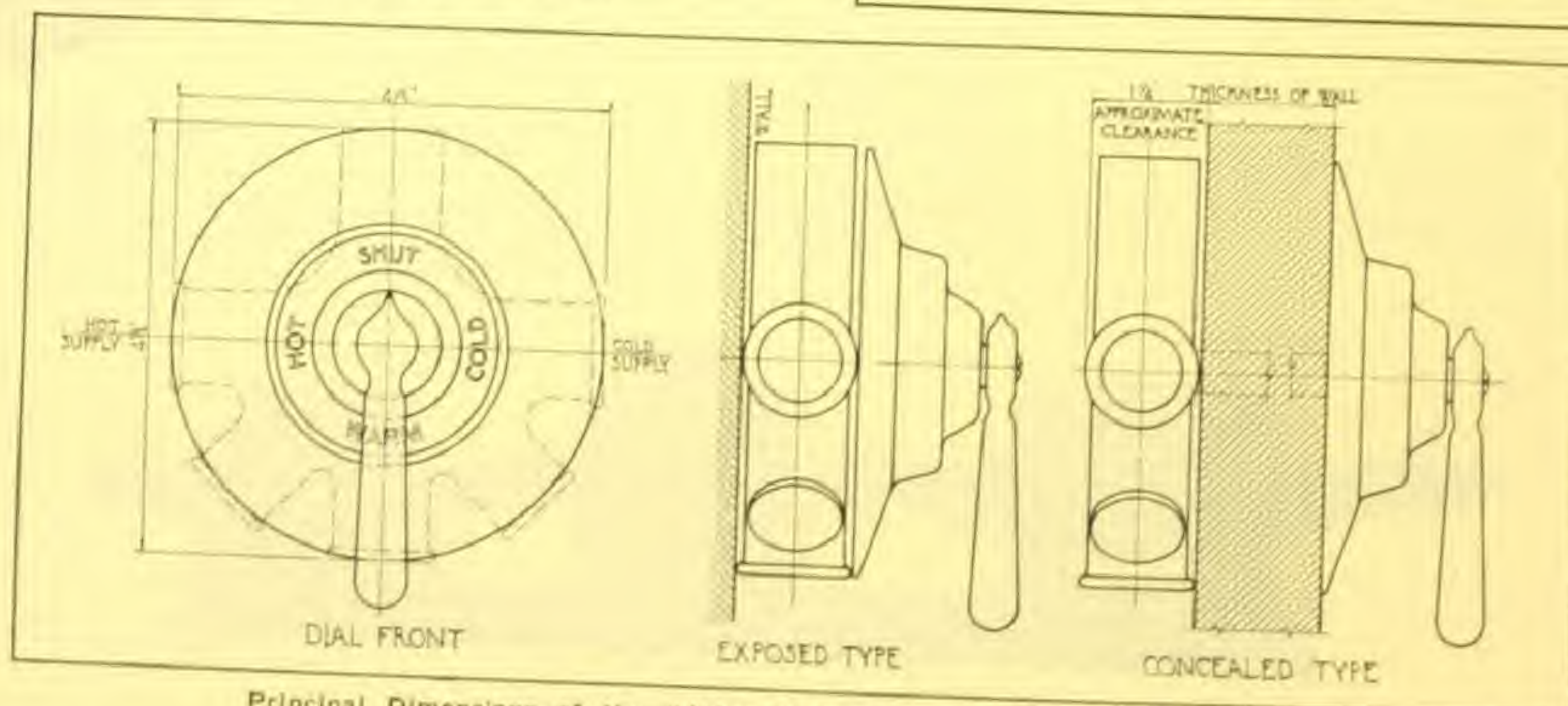
**SUPPLIES.**—Cold and hot water supplies to mixer shall be not less than . . . . . W.I., and . . . . . copper tube, respectively. Union connections shall be of a standard size and interchangeable; joints in hot water lines shall be fitted with "Athena" compression fittings.

**Note.**—For first class installations, hot and cold water supplies to mixer should be provided with stop valves.

**SHOWER.**—Provide and install not less than 1/2 in. copper discharge pipe from mixer to shower-head, which shall be . . . . . in. diameter and nickel-plated.

**Note.**—There is a second connection on the mixer which permits of a mixed supply to the tub, if so desired.

**EXPOSED PIPING.**—All exposed piping shall be nickel-plated and, where necessary, risers shall be secured with approved nickel-plated brackets.



Principal Dimensions of the "Athena" Exposed and Concealed Mixing Valve.



**"ATHENA" FLUSH VALVES****Description**

The "Athena" Valve is designed to meet the requirements of a simple, efficient, lasting flush valve having the ability to deliver the exact amount of water to effectively flush the fixture. Too much delivery is waste, and too little is unsatisfactory service. Used with any make of WC pan, the "Athena" valve will discharge enough water for a thorough flush—no more, and no less.

The absence of complicated mechanism, which marks the construction of a number of flush valves, is a feature of the "Athena." It is of extremely simple construction, as the diaphragm preliminary and main valves are a complete unit, and constitute the only moving part, and this operates without friction. The metal used is a high-grade bronze, practically impervious to corrosion or wear.

**Operation**

A slight movement of the handle or push button results in a quick positive complete flush—no strength or special method of operation required. This is of special importance to women, children and invalids, for whom easily-operated equipment should be provided.

**Maintenance**

Maintenance costs are reduced to a minimum in the "Athena," as the only wearing part is the rubber diaphragm, which, when it occasionally does need replacement, can be made at a very low cost and in very short time by a plumber on the job. With the piston type of flusher, renewals or adjustments can only be made by a competent engineer, who generally has to remove the valve and take it to his works, which means a very high repair bill. Also, cup leathers are not as lasting under water as a rubber diaphragm.

**Advantages**

- 1—Cannot be held open to waste water.
- 2—Delivers a uniform flush regardless of how operated.
- 3—Does not require regulation for any variation of water pressure.
- 4—Minimised cost of maintenance and repair.

**Styles**

"Athena" Flush Valves are suitable for exposed or concealed installations. Standard equipment includes nickel-plated "Athena" Flush Valve and Wall Flange. Unless otherwise specified, equipment will be as above. Chromium-plated valves with china oscillating handles or push buttons can be supplied at a higher cost. "Athena" Flush Valves can be equipped in any of the following styles or combinations thereof. When any of these styles are wanted, specify "Athena" flush valve, followed by the letters indicating the desired type.

**Stops**

- Style A: With angle stop—No extra cost.  
Style B: With straight stop—No extra cost.

**Inlets**

- Style C: With inlet on right hand side of flush valve—No extra cost.  
Style D: With inlet on left hand side of flush valve—No extra cost.  
Style E: With inlet at back of flush valve—No extra cost.

**Handles**

- Style F: With metal oscillating handle—No extra cost.  
Style G: With china oscillating handle—Extra cost.  
Style H: With handle on left side of flush valve—No extra cost.  
Style I: With handle on right side of flush valve—No extra cost.  
Style J: With handle in front of flush valve—No extra cost.

**Buttons**

- Style K: With metal push button—No extra cost.  
Style L: With china push button—Extra cost.

**Flush Connections**

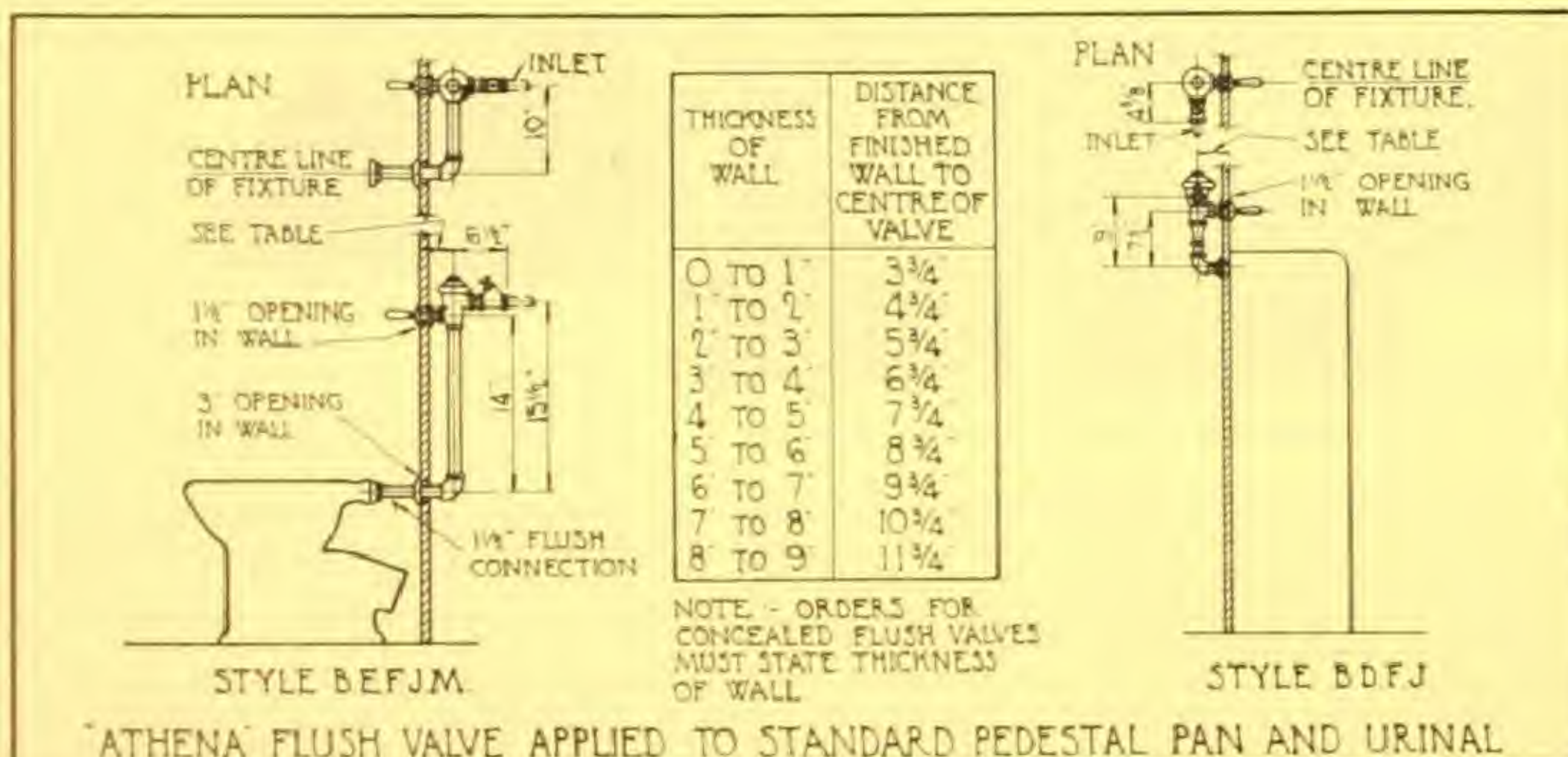
- Style M: With 1½ in. elbow flush connection—Extra cost.  
When specifying concealed "Athena" Flush Valves, state the thickness of walls. An extra charge is made for the concealed type.

**Installations**

Installations can be done by any certified plumber. The connection between flusher and the pipe which leads to the pan is made with compression joint, which means that the only tool necessary is a wrench to tighten nut.



"Athena" Flush Valve—Exposed  
Model applied to Pedestal Pan.



**New Closets.**—1½-inch pipe from supply tank (which must be at least 10 ft. high above valve) to flusher. Connection between flusher and closet is generally with a 1½-inch copper tube; all connected to suit the local authorities.

**Existing Closets.**—No alteration need be made to the closet, providing that there is a 1½-inch pipe from supply tank to flusher.



29h


S.A.A. File No.

# R. H. MYTTON & Co. PTY. LTD.

MANUFACTURERS

125 YORK STREET, SOUTH MELBOURNE, VICTORIA

TEL. M 1183



TRADE MARK

## Products

"Silva" Sinks, Metal Ceilings, Cornices, Mouldings, etc.; "Mytton" Skylights, Ventilators, Roof Cowls, Ventilating and Plain Ridging, Ceiling and Wall Vents; "Mytton" Glazing Bars; Copper, Brass, Bronze, Ornamental and Structural work of all descriptions built to specifications.

## Service

Our representatives will submit details of any of our products on request and our Service Department is prepared to develop special designs or installations under the architect's instructions.

## Guarantee

All "Mytton" goods are absolutely guaranteed against faulty workmanship; and any defects claimed to arise therefrom will be rectified immediately.

## Literature

Detailed special Catalogues, dealing with the several "Mytton" products, Brassware, "Silva" Sinks, Metal Ceilings, etc., are always available, and will be forwarded with pleasure to any persons desiring information.



"SILVA" KITCHEN EQUIPMENT

## "SILVA" SINKS

### Materials and Manufacture

"Silva" is the trade mark applied to all sinks manufactured by us. (The architect should clearly specify whether the sink is to be wholly of Monel Metal, White Metal, or Silveroid.)

Sinks are supported on rigidly constructed wooden frames—drainboards and skirtings (or splashbacks) are made of one piece of metal; the drainboards, having corrugated surfaces, are pitched to the basin, whilst the backs, of smooth-faced surfaces, are well

Unless otherwise specified, all "Silva" Sinks will be supplied with the standard 4-inch skirting (or splash-back) front and side apron and rolled edges. Monel Metal or White Metal plugs complete the fitment.

### Advantages of "Silva" Sinks

In addition to the pleasant appearance which Monel Metal lends to all fittings of which it is an integral part, it also adds to "Silva" Sinks many other features—the



Illustration. Double Sink and Drainer.

carried up against the wall. The basins have well-rounded, re-entrant angles, and are made for quick drainage, and the joints at drainboards are well sweated; the whole thus forming a watertight and non-fouling job.

Turned-up ends may be formed in the above construction—also the back skirting may be boxed out, forming a ledge on top and a recess under to conceal pipes. Other ways of finishing the back provide a flange to turn-up back of wall tiles.

one-piece back and draining-board and the elimination of all gaping joints between basin and drain-board absolutely do away with all possibility of the collection of dirt and grease at these points. Other distinct advantages over the old style of sinks are:—more resilient, thus eliminating breakage and chipping of fine china and crystal; no wash-up dish is required, since the basins are of convenient size and shape; non-stainable; do not chip, and are practically indestructible.



**Standard Sizes**

"Silva" Sinks are available in standard and special sizes as follows:—

**Stock Sizes:—**

Type "A"—4 ft. long x 1 ft. 6 in. wide,  
5 ft. x 1 ft. 6 in., 6 ft. x  
1 ft. 6 in., fitted with  
standing flexible waste.

Type "B"—Same overall size as  
Type "A."

Type "C"—Single basin—4 ft. x 1 ft.  
3 in.  
Double basin—5 ft. 3 in.  
x 1 ft. 3 in.

Basins for Types "A" and "B" are  
each 15½ in. x 14½ in. x 8 in. deep, and  
for Type "C"—13½ in. x 13½ in. x 8 in.  
deep.

Draining-boards to Type "A" and  
"B" are each 16 in. x 15 in. and 16½ in.  
x 13½ in. for Type "C."



Illustration. Type B. Stock Size. 4 ft. x 1 ft. 6 in.

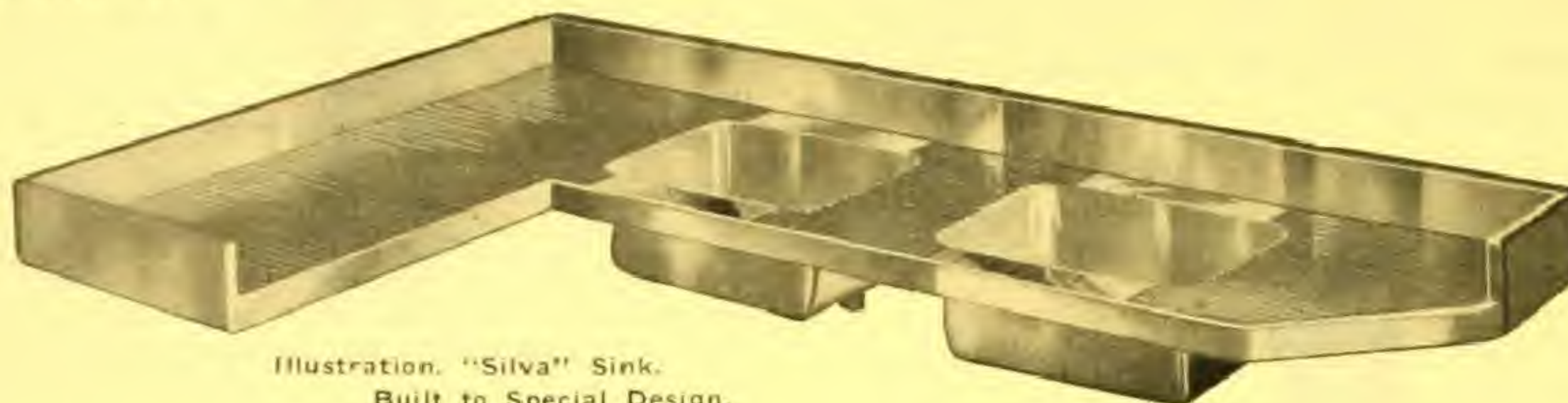


Illustration. "Silva" Sink.  
Built to Special Design.

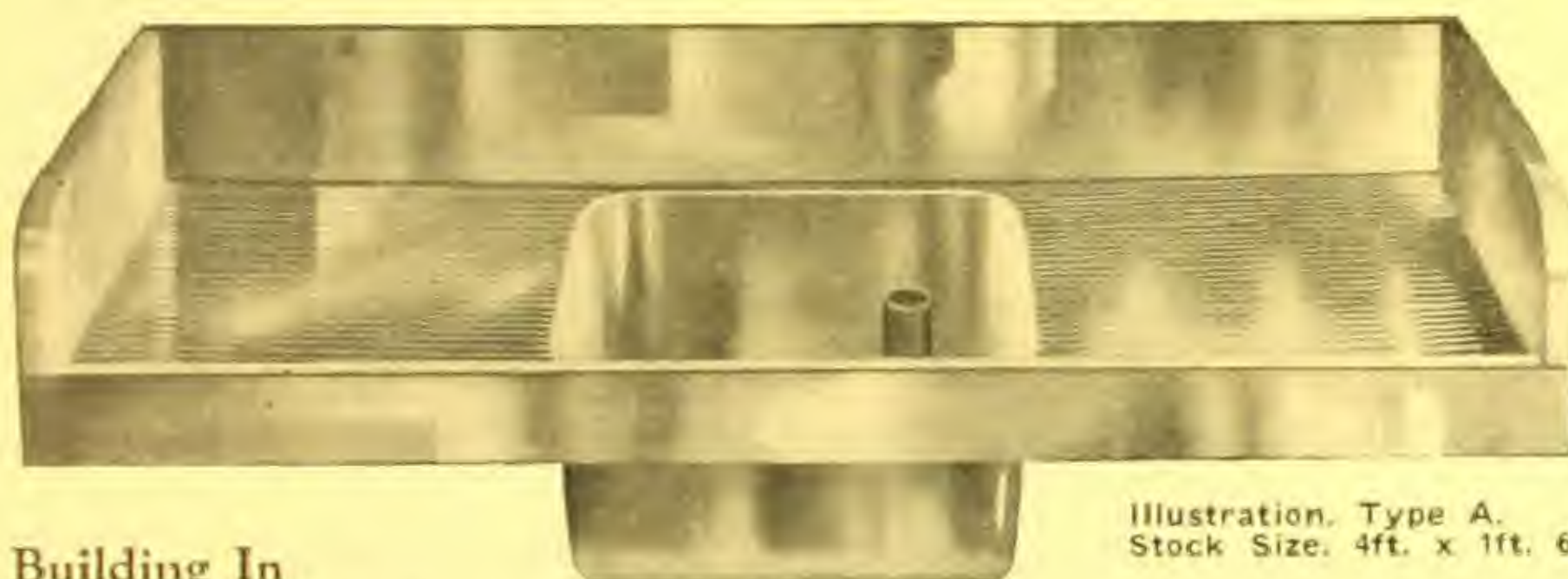


Illustration. Type A.  
Stock Size. 4 ft. x 1 ft. 6 in.

**Special Design**

We are prepared to manufacture any  
style or size of sink to order, and to fit  
various recesses and corners, also  
butlers' pantry and hotel kitchen sinks.

In ordering "Silva" Sinks to be  
manufactured to a special design,  
please submit the dimensions "A" to  
"K" as set out in the Dimensional  
Drawing.

**Building In**

All sinks, whether standard or  
special, are built for quick and easy  
installation. In general, "Silva"  
Sinks are supported on light framing  
or fitted in over cupboards. They  
may also be supported on wrought-  
iron brackets.

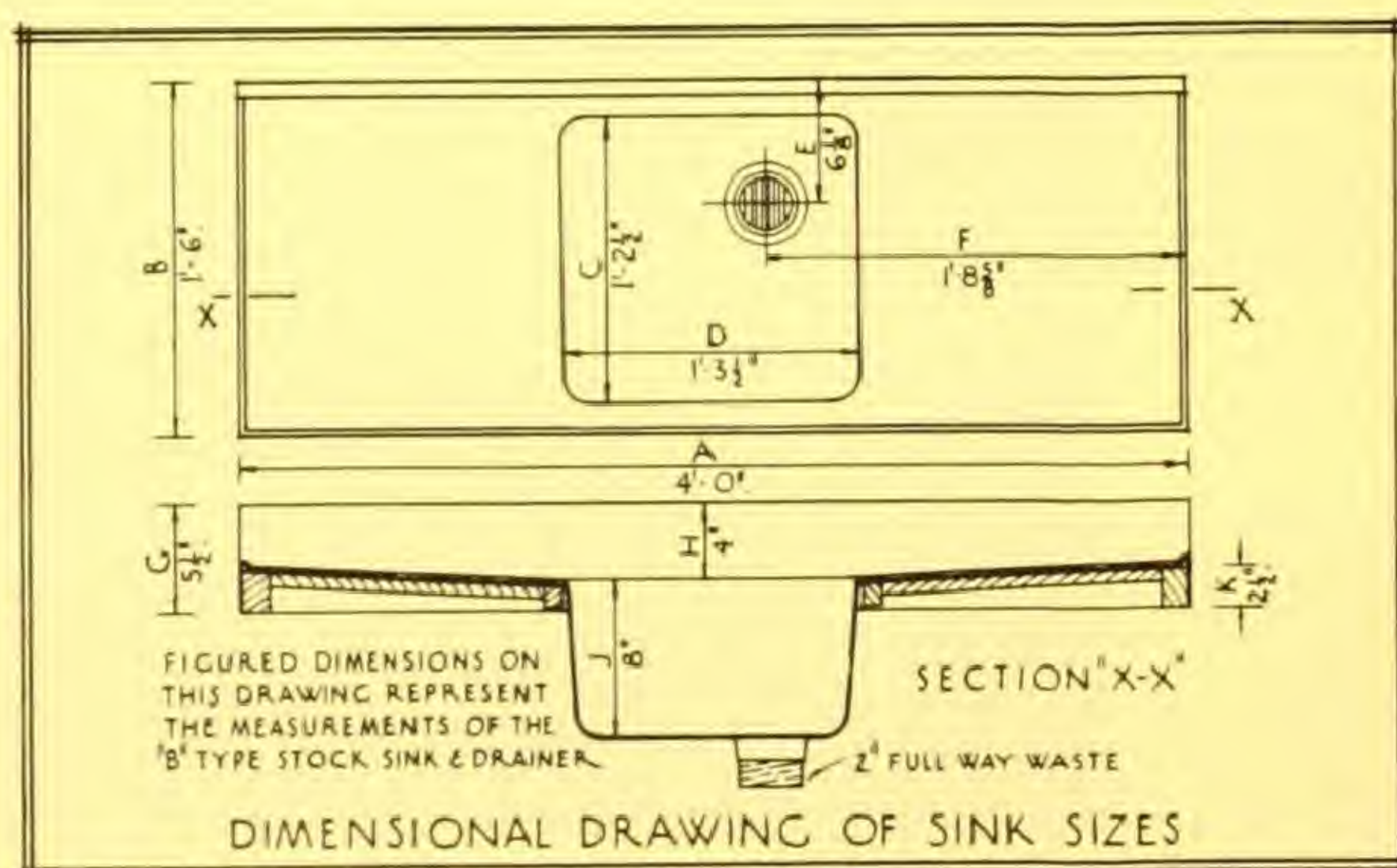
**Table Tops, Cabinets, Food  
and Dish Warmers**

Monel Metal makes an excellent  
table-top and may be successfully  
fitted over an old wooden table-top  
by means of a flange.

Metal cupboards are also obtain-  
able to fit under any sink made by  
us; they may be supplied with any  
number or arrangement of doors,  
and with built-in sections for food,  
or electric warmer, etc.

**Specification**

All sinks in . . . . .  
or where indicated on plans, shall  
be wholly Monel Metal "Silva" Sinks  
as manufactured by R. H. Mytton &  
Co., and shall be of the following  
types and sizes:—



(Drawn by the Architectural Staff of Ramsay's Catalogue)

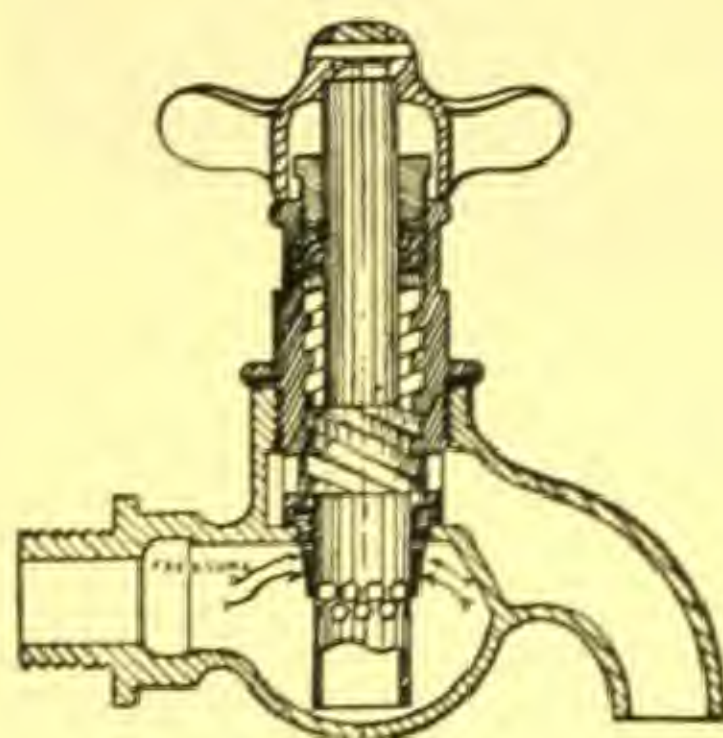


29h	<b>NOYES BROS. (MELB.) PTY. LTD.</b>		<b>NON-DRIP TAPS</b>
	SOLE LICENSEES, MANUFACTURERS AND DISTRIBUTORS		
	597-603 LONSDALE STREET, MELBOURNE, VICTORIA. Phone: Cent. 10106.		
	119 PIRIE STREET, ADELAIDE, S.A.		
S.A.A. File No.	TASMANIA: 36 ARGYLE STREET, HOBART		59 GEORGE STREET, LAUNCESTON

[For Other Products, See Page 439]

**NON-DRIP TAP—HOWELL'S PATENT**

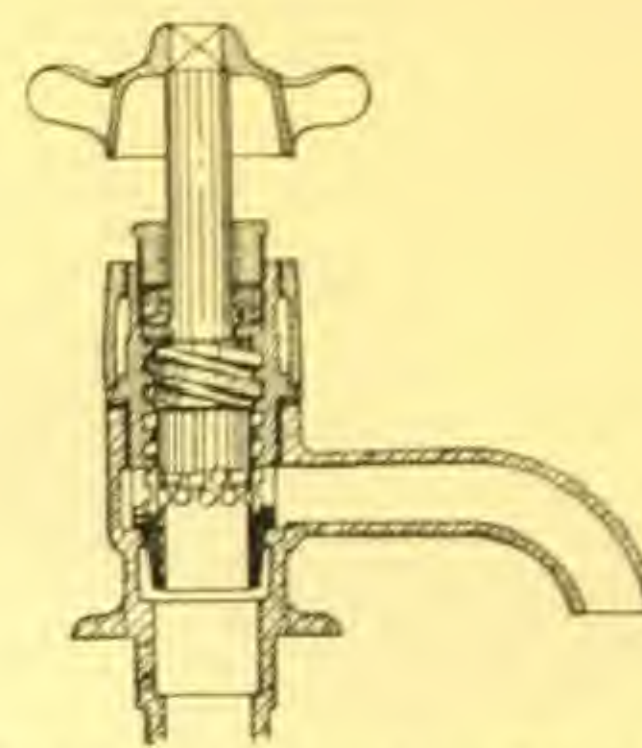
Because this unique Washerless Tap has neither washers nor seatings, it does not leak or drip, and it costs very little more than the ordinary tap. In a physical laboratory test a Washerless Tap was turned on and off 258,000 times without a sign of leakage. It is available for every purpose—domestic, baths, wash houses, workshops, underground stop cocks, etc.



Capstan Head Bib

**Principle and Operation**

The illustrations show that the novel principle on which the Howell Patent Dripless Tap operates is by a sliding movement of the water ports inside a special type of rubber sleeve or cone. This sleeve is operating under ideal conditions for long life in rubber, viz., under water and in compression. There is only a sliding movement inside the cone and no grinding or abrasive action, tending to wear it out; dirt does not affect their seatings, there are no springs or delicate parts to break, no water hammer, and they act quickly and easily. There is no need to screw them down hard—just turn off the flow and it remains off and dripless.



Sectional View—Lavatory Pillar Type

**Types and Sizes Available**

	Brass		Nickel or Chrome Plated	
T. Head Bibcocks	1/2 in.	3/4 in.	1/2 in.	3/4 in.
T. Head Stopcocks—Polished	1/2 in.	3/4 in.	1/2 in.	3/4 in.
T. Head Stopcocks—Unpolished	1/2 in.	3/4 in.	1/2 in.	3/4 in.
T. Head Hosecocks	1/2 in.	3/4 in.	1/2 in.	3/4 in.
Capstan Head Bibcocks	1/2 in.	3/4 in.	1/2 in.	3/4 in.
Capstan Head Stopcocks	1/2 in.	3/4 in.	1/2 in.	3/4 in.
Capstan Head and Sheath Bibcocks	1/2 in.	3/4 in.	1/2 in.	3/4 in.
Capstan Head and Sheath Stopcocks	1/2 in.	3/4 in.	1/2 in.	3/4 in.
Capstan Head Pillar Cocks	1/2 in.	3/4 in.	1/2 in.	3/4 in.
Capstan Head and Sheath Pillar Cocks	1/2 in.	3/4 in.	1/2 in.	3/4 in.

All required designs are available, including knee and arm operated taps for surgical and hospital work.

**Official Tests Showing Indestructibility**

	Turns	Water Temp.	Results
Physical Laboratory	278,000	60 deg.	No leak
Liverpool Water Board	200,000	180 deg.	No drip
B.W. Association	100,000	60 deg.	No wear, No drips

**Passed by the following Large Water Boards**

Melbourne and Metropolitan Board of Works.  
Brisbane City Council Water Supply and Sewerage Dept.  
Manchester Water Board.  
South Staffordshire Water Board.  
Metropolitan Water Board, etc., etc.

**OTHER NOYES BROS. PRODUCTS**

Accessories, Electrical  
Ammeters and Voltmeters  
Tombs & Howcroft Products  
Bells and Battery Material  
Brackets  
Callender's C.M.A. Cables  
Crabtree Switches and Plugs  
Conduit and Fittings  
Fibre Sheets, Rods and Tubes  
Fittings, Residential and Commercial

Fuses  
Fans  
Fires  
Floodlighting  
Heating Appliances  
Ironclad Switches and Fuses  
Insulators  
Insulating Board, Sindanyo  
Ironing Machines

Lamps, M.F. and Gasfilled, Philips  
Lighting Fittings  
Radiators  
Refrigerators, Electric  
Soldering Irons  
Sebeco Anchors  
Table Lamps  
Vacuum Cleaners  
Washing Machines



## GRACE BROS. LTD.

BROADWAY, SYDNEY

NEW SOUTH WALES

SANITARY  
WARE

BATHROOM FITTINGS

29 i

S.A.A. File No.

[For Other Products, See Pages 265, 419, 490]

## Products

Bath Tubs, Bathroom Cabinets, Mirrors, Towel Rails, Grab Rails, Built-in Holders for Soap, Sponge, Tumbler, and Tooth Brush Holders; Shelves, Toilet Paper Holders, Showers, Wash Basins, Seats, Bath Mats, Bathroom Lighting Fixtures, Bath Heaters, Water Closets, Cisterns, Flushers, W.C. Seats, etc., Sinks—Porcelain and Monel Metal, Combined Sinks and Draining Boards, etc.

## The Bathroom

In the modern home the bathroom occupies a very important position, and as the architect is so often entrusted with the planning of this important department, he has demanded high quality fittings with which to make the bathroom hygienic, pleasant, and colourful.

Care taken in the designing of the bathroom and in the selection and installation of the fittings, is amply repaid by the final result. Of great importance is the correct relationship of the various units to one another, and to the windows and doors.

## Finish

The importance of having fittings which have a high-class finish will be realised by all architects, but of equal importance is the manner in which these finishes will stand up to long usage without tarnishing, in the case of metal fittings, or discolouring and chipping, in the case of porcelain, earthenware and glass finishes.

All fittings stocked by Grace Bros. Ltd. are of the highest quality, and are guaranteed to stand up to severe usage.

## Displays of Products

Grace Bros. Ltd. have in their Bathroom Fittings Department displays of their stock, where various types of fittings may be compared. Co-operation in this manner will, we are sure, be of material assistance to the architect, and clients, when selecting fittings for the home, hotel, apartment, public and office building, mercantile building, and factory.



A Completely Equipped Self-contained Bathroom.

(Continued on next page)



## GRACE BROS. SPECIALISE ON SANITARY FITTINGS



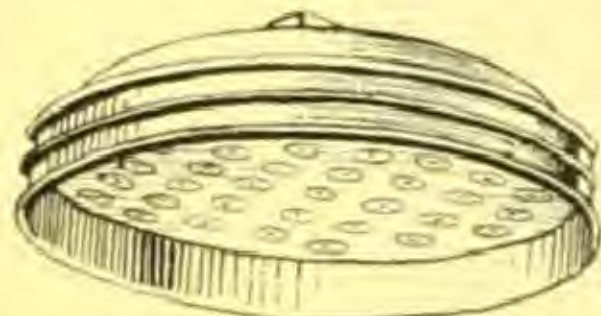
XQ4.  
Lead Traps.  
S. & P. Traps—1½, 1½, 2 in.  
Lengths—Ordinary, 12, 18, 24 in.



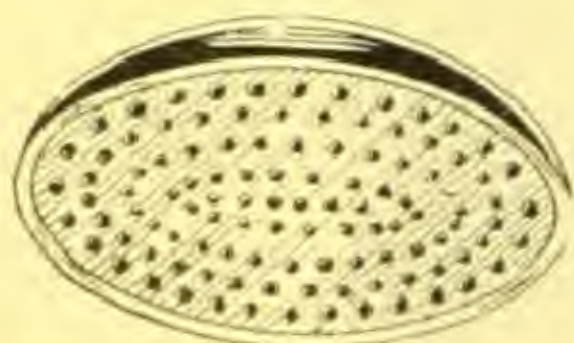
XQ5.  
Brass Traps.  
S. & P. Traps—1½, 1½, 2 in.



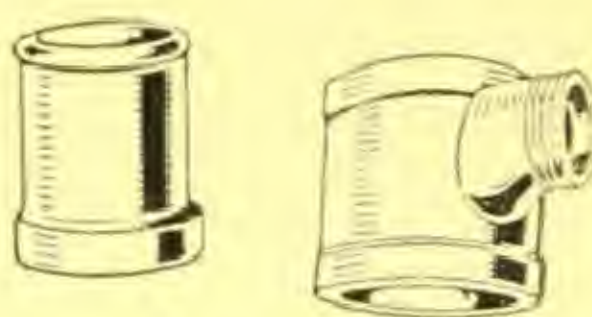
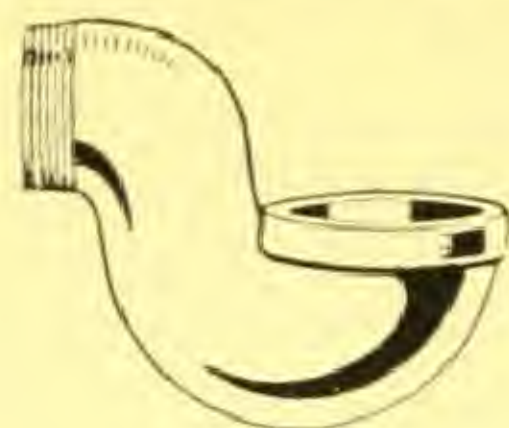
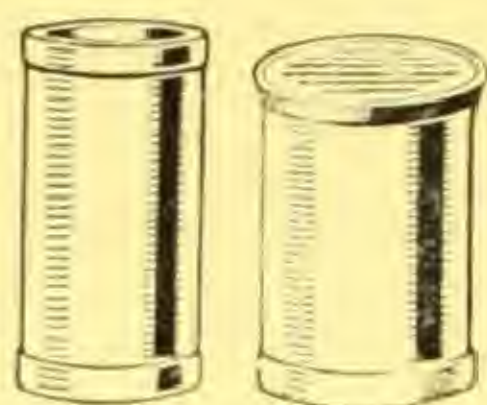
XQ8.  
H.P. Easy Clean, Nickel-Plated  
Pillar Cocks.  
Hot or Cold—½ in.



Anti-Splash Shower Heads—  
Nickel-Plated.  
6 x ½ in.; 6 x ¾ in.



Copper or Nickel-Plated  
Shower Heads.  
6 x ½ in.; 6 x ¾ in.



Brass Sanitary Fittings.  
1 in. Gully Traps—2, 2½, 3 in.  
Gully Sleeves, with I.O. and Vent—2½, 3 in.  
Gully Sleeves, with I.O.—2, 2½, 3 in.  
Gully Sleeves, Plain—2, 2½, 3 in.  
Gully Tops, with Single Inlet—2 in.  
Gully Tops, with Double Inlet—2 in.  
Gully Risers, with Grate—6, 9, 12 in.  
Gully Risers, Plain—6, 9, 12 in.  
Elbows, 85 deg., Plain—1½, 1½, 2 in.  
Elbows, 85 deg., with I.O.—1½, 1½, 2 in.  
Junctions, 85 deg., Plain—1½, 1½, 2 in.  
Junctions, 85 deg., with I.O.—1½, 1½, 2 in.



H.P. Easy Clean, Nickel-Plated Shower  
Cocks and Bibcocks.  
Hot or Cold—½, ¾ in.



H.P. Breeching Pieces.  
Palazzi Pattern—1½ x 2 in.  
Straight Pattern—1½, 2 in.

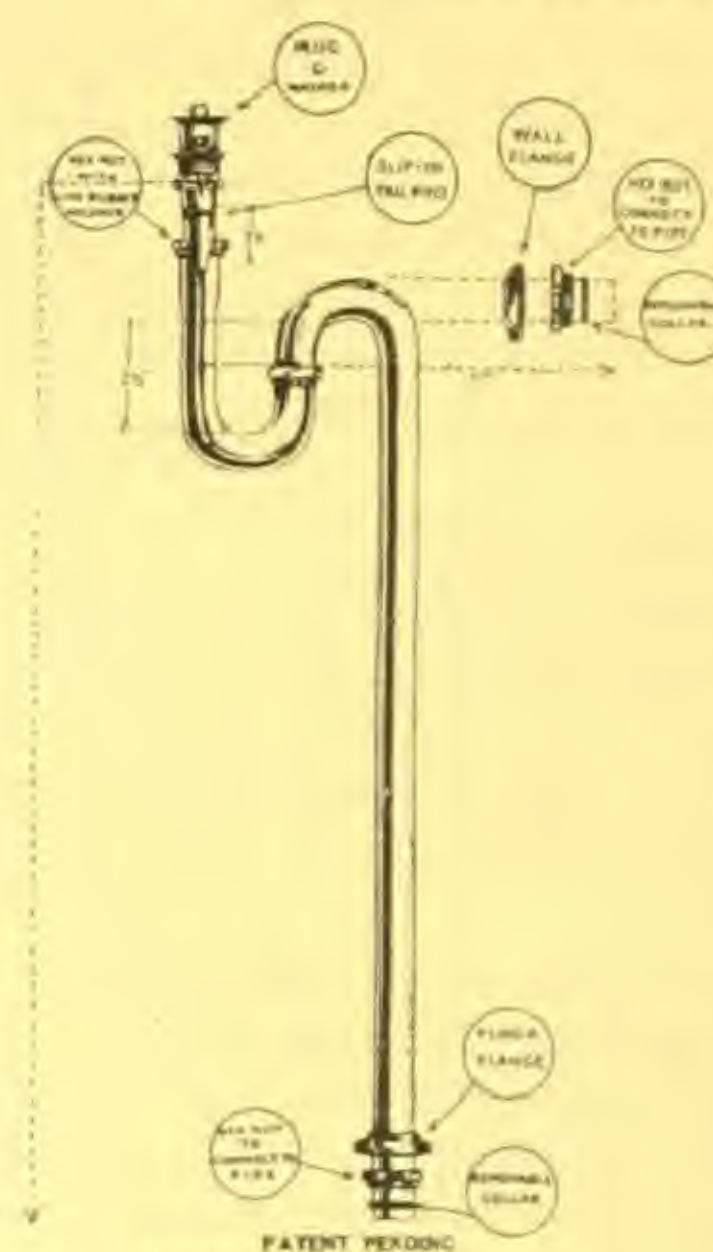


XQ1.

XQ1.

XQ3.

Brass Union Traps.  
S. & P. Traps—1½ x 1½, 1½, 2 in.



XQ2.

Pinco.

Complete Trap and Waste for Lavatory Basins. Attractive in appearance and easily adjusted. Manufactured of that ever-lasting material—Brass. Complete fitting comprises:—

Nickel-plated cast patent overflow plug and washer, with a 1½ in. cast slip-in tail-piece.

Nickel-plated solid drawn tube trap, with cast hexagon coupling nuts and live red rubber washers.

Nickel-plated wall or floor flange.

Removable collar and cast hexagon coupling nut to screw into the iron waste-pipe.

**Advantages.**—The latest slip-in tail-piece has a margin of 3½ in. between the waste fitting and the trap, which allows the basin or the trap to be fitted independently, so long as the margin is not exceeded.

The Trap, on account of the slip-in joint, can be easily disconnected for cleaning purposes by removing the nut on the extension bend and drawing the trap off the tail-piece.

The extension arm from the trap, being connected as illustrated, enables the arm to be adjusted at any angle.

The removable collar can be fixed on the extension arm at any given point to connect to the iron waste-pipe. The coupling nut is first slipped on to the arm and the collar is then inserted and fixed at the requisite position, enabling the coupling nut to screw on to the threaded iron waste-pipe, making a perfect connection.

**SIZES**

Pinco Fitting (nickel-plated waste and trap complete, but without plug and washer), S. & P., 1½ in.



## SECTION L(a)

[Containing S.A.A. Filing Section No. 29 e]

# FIRE PROTECTION





# WORMALD BROS. LIMITED

FIRE PROTECTION ENGINEERS  
SINCE 1889

CITY OFFICE: 19 BLIGH ST., SYDNEY. FACTORY: YOUNG ST., WATERLOO, SYDNEY

## BRANCHES:

MELBOURNE—180 Bay St., Port Melbourne. BRISBANE—"City Buildings," Edwards St.  
NEW ZEALAND—"T. & G." Buildings, Wellington. ADELAIDE—Bowden.  
PERTH—Wellington St.

29<sup>e</sup>

S.A.A. File No.

[For Other Products, See Pages 148, 158, 244 and 264]

## The Grinnell Automatic Sprinkler System

Grinnell Automatic Sprinklers can be installed in any building—there is no limit to their adaptability. The Grinnell System is the oldest, most widely used and most successful Fire Protection system known. It consists of a series of self-operating valves, known as "Sprinkler Heads," connected at regular intervals throughout the ceilings and roof of the building to water pipes, fed through control valves by the street main or some other specially approved supply.

Grinnell Sprinklers will not destroy the artistic design of a ceiling—the pipes can be concealed so that only the small "head" need project. Two alarms operate automatically with the opening of a "head," so that, while water is being poured on to the fire, the Brigade is summoned and a bell ringing on the building face warns of the danger. Only the sprinkler nearest the fire opens—not the whole number on the one floor, as sometimes thought—so that water damage is negligible.

Your clients will have their insurance premiums greatly reduced by installing "Grinnell" protection (see details below). Plans showing proposed position of sprinkler heads will be submitted and full co-operation with you is assured in every way.



Grinnell Soldered Sprinkler Head.



Grinnell Quartzoid Sprinkler Head.

## CONNECTIONS, PIPING AND WATER SUPPLY

Automatic Sprinkler systems, to obtain the full insurance rebates, and known as "double supply installations," must be fed by two water supplies of independent sources. Two street mains are not permissible, unless they are from different reservoirs. The usual combination of supplies is:—one street supply and a tank of not less than 7,500 gallons. This tank is usually elevated above the premises, either on a steel structure or built on one corner with the building. Its position is unimportant, except for economy however, but it must be at least 15 feet above the highest sprinkler head.

If an elevated tank is not possible, a "pressure tank" can be substituted. This may be stored at ground level, but must have an automatic pump fitted, capable of pumping at least 5 lbs. running pressure on the highest sprinkler.

The tank supply is only an emergency supply in case of a fall in pressure or failure of the street supply, and so may be omitted. In this case, when the street supply only is connected, the installation is known as a "single supply," and is only subject to approximately half the insurance reduction.

## OPERATION OF THE SYSTEM

By pumping up pressure in the pipes, with the hand-pump fitted, to a point higher than the pressure of the street main, the "alarm" valve is automatically closed—the installation is

then ready for action. As soon as the heat of a fire strikes the nearest sprinkler head, the link (held with special fusible solder) melts and springs out. This leaves the head perfectly free for the water to flow through and by so doing removes the pressure from the alarm valve. The street water then flows through and causes the two alarm turbines to operate.

## INSURANCE REBATES

The rebates from Fire and Loss of Profits premium on building and contents vary slightly in Australia and New Zealand. For ordinary circumstances, however, they are:—

Double Supply: 47½-50 per cent. Australia; 45 per cent. New Zealand.

Single Supply: 30 per cent. Australia and New Zealand.

In most cases, the Industrial Bonus of 10 per cent. is also allowed.

(Continued on next page)



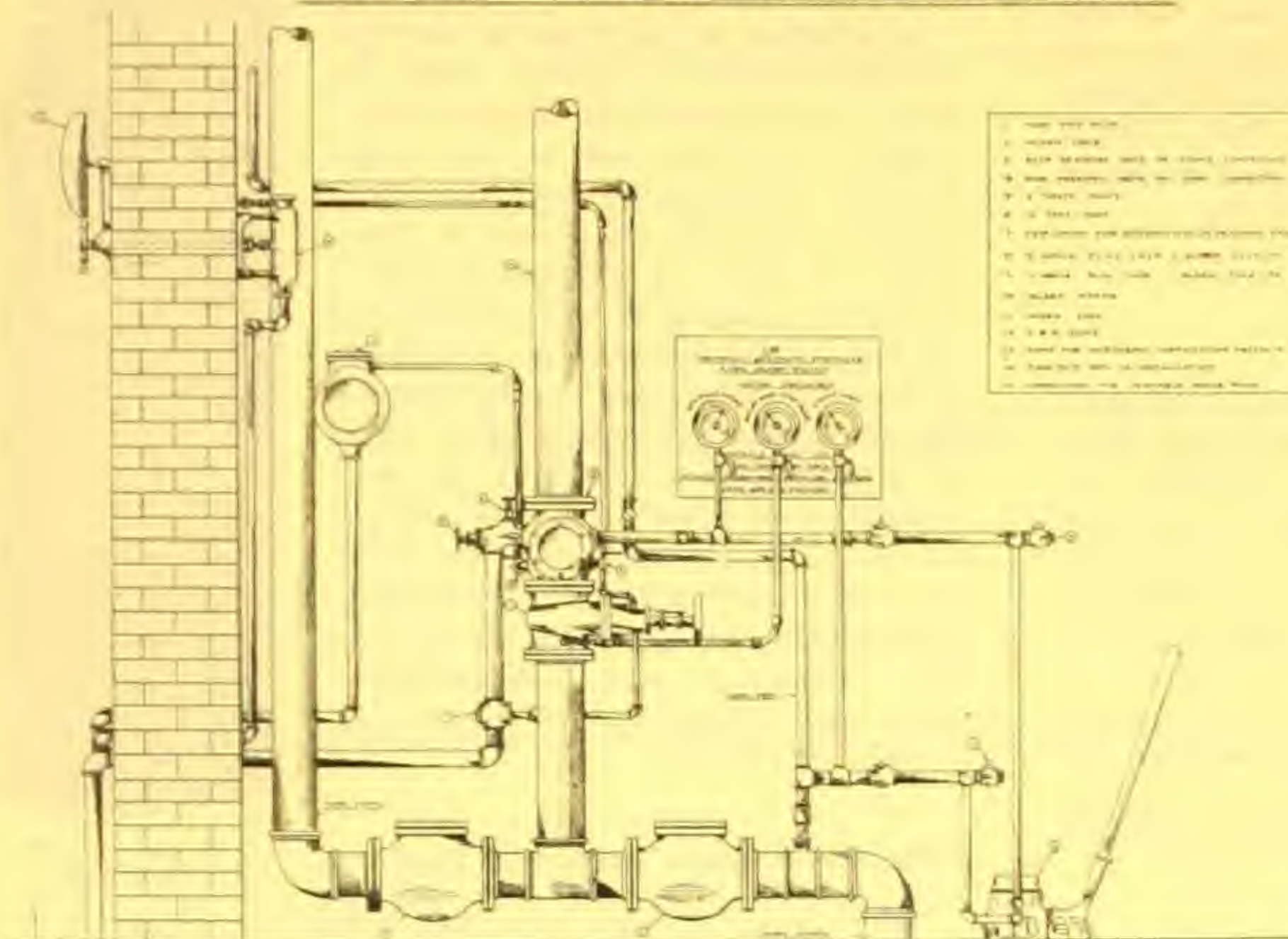
Showing Street Main and Tank Main Combining at Central Valves, with Sprinkler Pipes Radiating from them.



## — STANDARD SET OF VALVES —

— FOR —

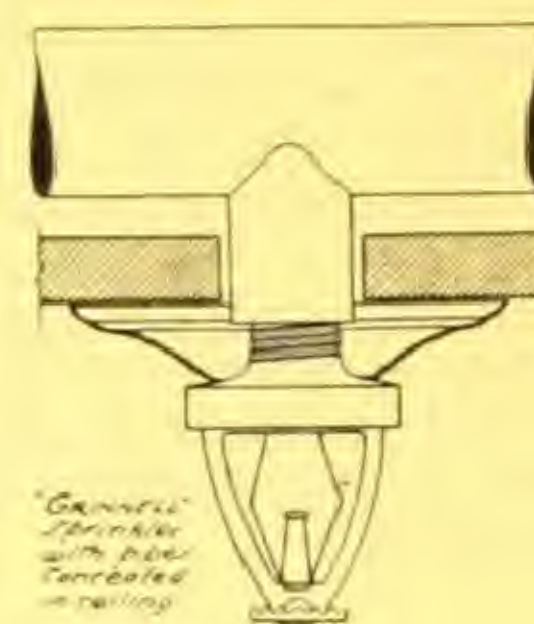
## — GRINNELL SPRINKLER INSTALLATION —



## Installation

All pipes are cut and screwed to exact sizes in the factory. The complete installation is sent on to the job ready for assembling. Hangers are available for any class of ceiling and special ceiling plates are employed when pipes are concealed, so that a neat appearance is guaranteed. For dropping through floors or running through beams in concrete, galvanized sleeves, as shown, are set in place before pouring.

## SPRINKLER IN CEILING



## The Grinnell Soldered Sprinkler Head

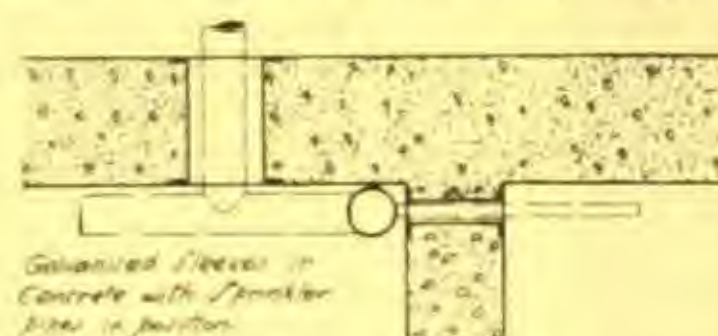
The "Grinnell" Soldered Head is for use in any circumstances, except where there are corrosive fumes detrimental to lead and zinc solder. It is extremely simple in construction and therefore the most reliable sprinkler manufactured. The water is held back by a glass valve, which seats on a flexible diaphragm. This flexibility takes up variations in pressure and so prevents leakage. The glass valve is held in position by a strut composed of two movable parts which are held with special solder. The fusing point is normally 155 deg. Fahr., but for special risks, high temperature heads are made up to 360 deg. Fahr.

## The Grinnell Quartzoid Sprinkler Head

The "Quartzoid" Head varies only in the strut. A glass bulb full of a special chemical holds the glass valve in place. The heat of a fire expands the liquid, breaks the glass and releases the valve. These heads are not affected by acid fumes.

## Fixing in Concrete

For fixing pipes to concrete ceilings, special drills are used, and "Tampin" or other approved expansion plugs are inserted and ordinary clips screwed to them.



Pipes can be concealed in concrete, but special arrangements must be made. We are always ready to discuss this with you in detail.

## Tests

Installations should be tested each week. We have a specially trained staff for doing this at a mere service cost. A special test valve facilitates this work, and is always fitted at the main control valves.

## Typical Installations

Grace Bros. Ltd., Sydney.  
Anthony Hordern & Sons Ltd., Sydney.  
British-Australasian Tobacco Co. Ltd., Sydney.  
Myer's Ltd., Melbourne.  
Yarra Falls Spinning and Weaving Mills, Victoria.  
Over 1,000 buildings in Australia.

## Grinnell Drenchers

Grinnell Drenchers are "Open" Sprinkler Heads placed over windows on the outside of a building to protect it from fire in an opposing building. They are controlled by a hand valve, generally placed in an accessible position on the ground floor and, when turned on, they form an absolute curtain of water down the exposed face. All pipes used in Drencher Systems are galvanized to withstand corrosion. Fully detailed plans will be supplied when quoting for an installation.

(Continued on next page)



The Direct Brigade Alarm Turbine.

## Direct Brigade Alarm

This Direct Brigade Alarm is a feature which gives protection against unnecessary water damage. It operates automatically with the "Grinnell" system and transmits an electrical alarm to the nearest fire station. By so doing, the brigade is called instantly, and on arrival they turn the water off immediately. The alarm is operated by water—on passing through the alarm valve—playing on to a turbine. This revolves, and in doing so breaks the contact of an electrical circuit and registers on a special indicator board at the fire station.



## CHEMICAL FIRE EXTINGUISHERS

## Types of Extinguishers

Some fires call for the use of different chemicals and so we manufacture various types of extinguishers to give protection in all circumstances. Every machine is guaranteed to pass the requirements of the Fire Underwriters' Association and has been approved and accepted by the Commonwealth and State Governments.

## Selection of Correct Type

The most suitable type is determined by the class of fire risk. If required for ordinary hazards other than those mentioned specifically below, the "Simplex" is recommended. For any inflammable liquid or product which will float and burn on the surface of water, the "Pyrofoam." For any electrical risk—switchboards, power house, etc., the "Phister" or "Simplex Auto."

The actual number required is governed—for insurance reduction purposes—on the rule of one machine for every 250 sq. yards of floor space, with a minimum number of two per floor. In special cases, however, let us advise you.



Reversible.

Plunger Type.

## "Simplex"

The "Simplex" is known as a "Soda and Acid" Fire Extinguisher and is used for all ordinary risks. It is of two gallons capacity—light enough for a lady to handle—easy to operate—instantly effective. There are two types of "Simplex," though both are for the same class of risk:—

- (1) The Reversible is operated by simply turning it upside down and spraying the liquid on to the fire.
- (2) The Plunger type is operated by striking the plunger on top and so breaking glass bottle inside.

## "Pyrofoam"

Pyrofoam Liquid floats on the top of any burning liquid without mixing and so eventually spreads over the whole surface till it smothers the flames. The two-gallon machine shown here generates eight gallons of "Foam," and so is capable of extinguishing quite a serious fire. It is operated by turning it upside down in a similar way to the "Simplex," and must be recharged every twelve months. "Pyrofoam" is the correct type of machine to have at any spray-painting booth, and is guaranteed to pass all requirements of the Insurance Companies in this regard.

## Diptank Models

In addition to the chemical engines described below, a special model is made for diptank risks. This is automatic in action, and is the only "Foam" Extinguisher of this type which is officially approved in Australia. It is of 16 gallons capacity, though it generates 128 gallons of "Foam." This machine is of special benefit for paint and varnish manufacturers for protecting their vats of inflammable products. It is suspended over them from the ceiling or on a framework over the vats. A fusible link holds the container in position, so that the heat of a fire releases it and automatically pours the "foam" over the entire surface of the vat.

2-Gall. Hand  
"Pyrofoam."

## "Phister" and "Auto" Type

These two extinguishers come under the heading of C.T.C. (Carbon Tetra Chloride) machines. This is a liquid guaranteed to be a non-conductor of electricity up to 40,000 volts, and so is particularly suitable for all electrical risks. The "Phister" is used extensively by the State and Commonwealth Governments throughout their power-houses and has proved its worth on many occasions. With this machine the liquid is expelled by compressed air pumped up, when charged, by the hand pump fitted. No movable parts are actually in liquid and, as the chemical does not deteriorate, it does not need attention.

The "Auto" type is a small one-quart extinguisher designed primarily for use on motor vehicles, as the liquid is also very effective on petrol fires. It is used, however, with equal success on switchboard or factory electrical fires where the larger "Phister" is not warranted.

1-Gall. C.T.C.  
"Phister."

## Chemical Fire Engines

Chemical Engines are made in both "Simplex" and "Pyrofoam" types and are used for large factories where isolated buildings need protection, and also for timber yards and similar risks where a large quantity of liquid is needed. They are made in 10-gallon and 35-gallon models, mounted on wheels, with approximately 40 feet of hose, so that a considerable range is given.

## Maintenance Service

All extinguishers, other than C.T.C. types, should be inspected every twelve months. The "Simplex" Plunger type need only be recharged every three years, but the others should be done every twelve months. We have a trained staff to carry out this work at a nominal service fee, and by having us do it all anxiety is removed from the owners.



## SECTION L(b)

[Containing S.A.A. Filing Section No. 29f]

### GAS and GAS APPLIANCES

#### MODERN METHODS OF COOKING AND HEATING WITH GAS

The universal use of gas for cooking and for practically every kind of heating furnishes striking evidence of the general utility and excellent efficiency of this clean, dependable fuel. It is the purpose of this section to deal with the leading uses for gas, and to describe briefly some of its principal advantages for cooking, water heating, room warming, refrigeration and incineration, also to supply a brief outline of the uses for gas in the industrial and commercial fields.

The use of gas for both domestic and industrial purposes is the subject of constant investigation and research, so as to secure the modernisation of existing appliances and to promote the highest standards of efficiency in new appliances.

Architects and builders, and also those interested in home building, are invited to avail themselves of the up-to-date facilities provided by The Australian Gas Light Co. for supplying information, advice and assistance in connection with the use of gas and the selection of modern labour-saving gas appliances.

Because of space limitations, descriptions are necessarily brief, and illustrations are limited in number, but more detailed information relative to any phase of gas cooking or gas heating will be gladly supplied on request.





# THE AUSTRALIAN GAS LIGHT CO.

PITT, BARLOW AND PARKER STREETS, NEWMARKET, SYDNEY.

Phones: M 6503 (24 lines)

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GAS FOR COOKING, WATER HEATING, ROOM AND SPACE HEATING,  
REFRIGERATION, INCINERATION, CLOTHES DRYING.  
GAS FOR INDUSTRIAL HEATING, STEAM RAISING.  
BY-PRODUCTS:—COKE, DURATAR, DURATAR EMULSION, DURAVIA, DURATENAX,  
PITCH, TAR OILS, BENZOL, TOLUOL, SOLVENT NAPHTHA, PYRIDINE, SULPHATE OF  
AMMONIA.

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APPLIANCES

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## SECTION 1

### COOKING WITH GAS

Possessing, as it does, the major advantages of reliability, simplicity of operation, and low heating cost, the modern gas stove establishes strong claims for selection in every kitchen. Its advantages are clear cut and decisive, and they are expressed in terms of improved kitchen comfort, greater cooking convenience and permanent cooking economies.

#### MODERN IN EVERY DETAIL

In conception, design and construction, as in minor details, modern gas stoves reflect the most progressive ideas in cooking equipment. They conform to modern trends, satisfy new demands, and guarantee a standard of cookery service that is not equalled by any other appliance.

#### MODELS FOR EVERY KITCHEN

Modern gas stoves are made in so many different sizes and in such a wide variety of styles and finishes that even the most exacting demands in regard to appearance, style and service are faithfully met. The extended elevated type is particularly suitable for large kitchens—its general style conforming to up-to-date methods of kitchen layout. The

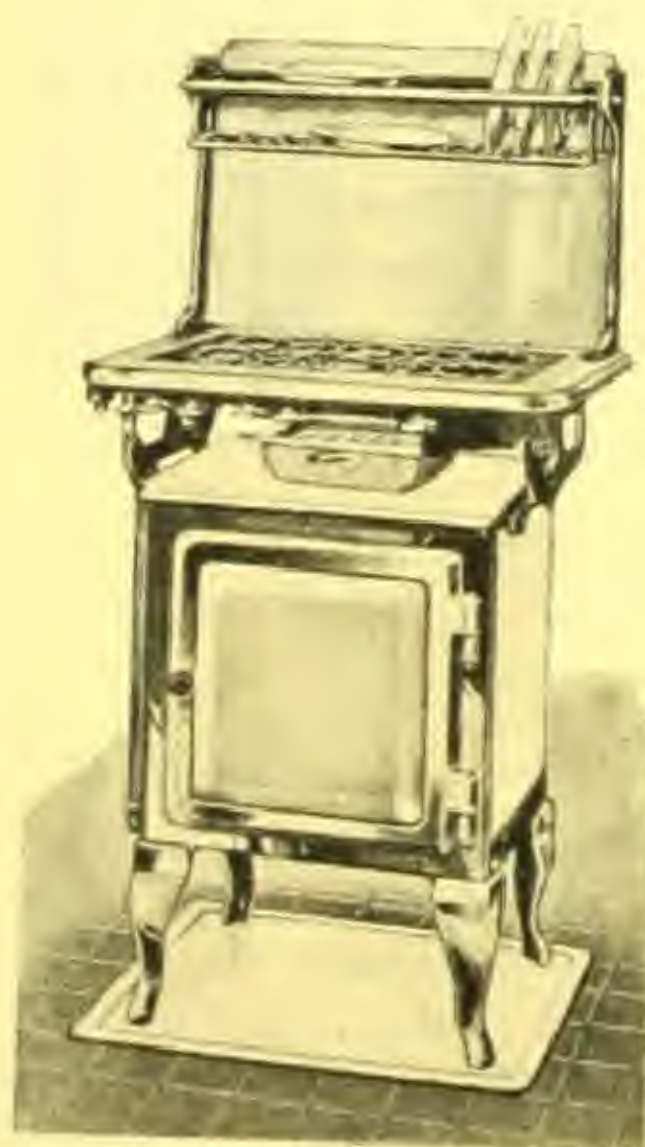
cabinet, or ordinary type, which is made in a very large number of sizes and styles, is ideally suited for small kitchens, or kitchens in which the amount of floor space is limited.

#### BEAUTIFUL FINISHES

The deft use of white, coloured and mottled porcelain enamel, glistening nickel and non-tarnishing chromium has given new beauty and fresh charm to gas stoves. It has widened the scope of kitchen beautification, introduced a pleasing atmosphere of brightness into the kitchen, and dispensed with frequent cleaning and polishing. Mottled enamel—a recent development in porcelain finishes—is practically indestructible, being heat proof and crack proof, whilst chromium—the new bluish plating with the lustrous surface—does not tarnish, and seldom needs rubbing.

#### MANY IMPROVEMENTS

Recent years have witnessed many noteworthy improvements to gas stoves, the most prominent being—Efficiency burners, re-designed hot plates, heat retaining ovens, oven temperature regulators, pilot lighters, drip-catching crown plates, elevated ovens, new styles, new finishes, new colourings and new models.



A popular cabinet model, finished in porcelain enamel and chromium plating.



Elevated Type—finished in new mottled enamel and chromium plating.

(This indestructible enamel is obtainable in many different two-colour effects).



Modern Gas Cooker—finished in new mottled enamel.

### TYPICAL EXAMPLES OF MODERN GAS STOVES



## Gas Cooking in Relation to Home Planning

Before planning a kitchen it is advisable to finalise details regarding the stove—location, size, style, appearance. This not only prevents disappointment, but makes it possible to secure the most pleasing results at relatively small cost. Architectural style of room, furnishing

arrangements and colour scheme—all these have a bearing upon the style and finish of the stove which should be used.

In installing a gas stove, care should be taken not to place it in a draught or in a position where it is either given too little working space or is isolated from the other kitchen appurtenances.

## FACTORS FAVORING GAS COOKING

**RELIABILITY.**—No other form of heat responds to human demands with such unflinching certainty.

**CONVENIENCE.**—A gas stove does not involve any preliminary or afterwork. It can be used at a moment's notice, as often as it may be needed, and for as long as it may be required.

**CONTROLLABILITY.**—Gas is the only fuel which gives absolute control over heating temperatures, and possesses a wide degree of flexibility.

**SIMPLICITY.**—No other stove provides such a simple, straight-forward method of cooking, or gives such accurate results without constant attention or frequent manipulation.

**ECONOMY.**—Gas cooking is cheaper than other methods.

**EFFICIENCY.**—A gas stove does all kinds of cooking perfectly with equal facility and does not necessitate the use of supplementary equipment.

**COMPARATIVE COST OF GAS AND ELECTRIC COOKING.**—In the appended table the cost of cooking a wide variety of foodstuffs with both gas and electricity, is set out. A careful study of the figures contained therein will furnish many interesting examples of the economy of gas.

Quantity of Heat in Therms Required for Family Consisting of Man, Wife and Two Children,  
on Basis of 51 Weeks per Annum.

## GAS

Town.	Brisbane	Sydney	Melbourne	Adelaide	Perth	Hobart	Remarks.
Degree Days.	516	1429	2554	1648	1296	3889	
Cooking	80.12	80.12	80.95	80.12	80.12	81.72	15% has been added to the gas consumed in the cooking tests to cover wastage and variations in modus operandi of various persons using gas.
Laundry	25.0	25.25	26.0	25.25	25.25	26.75	
Baths	19.92	39.85	45.83	39.85	37.86	47.82	
Fires	5.2	14.3	25.5	16.5	13.0	38.9	
Total	130.24	159.52	178.28	161.72	156.23	195.19	
Equivalent to volume in cub. ft. of gas of respective calorific value	25,640	29,000	32,710	29,400	32,900	35,740	
Cost of Gas in pence per Therm	17.1	12.5	15.6	20.3	20.0	22.1	
Total cost	£9/5/7	£8/6/2	£11/11/9	£13/13/7	£13/0/5	£17/19/6	
Actual average Therms used per consumer for all purposes	127.5	148.5	126.5	106.9	91.91	75.82	

## ELECTRICITY

Town.	Brisbane	Sydney	Melbourne	Adelaide	Perth	Hobart	Remarks.
Degree Days.	516	1429	2554	1648	1296	3889	
Cooking	42.61	42.61	43.1	42.61	42.61	43.5	
Laundry	13.2	13.3	13.7	13.3	13.3	14.1	
Baths	14.7	29.4	33.8	29.4	27.93	35.28	
Fires	3.6	10.0	17.9	11.5	9.1	27.2	
Total	74.11	95.31	108.5	96.81	92.94	120.08	
Equivalent to Electric Units	2170	2790	3178	2834	2721	3514	
Minimum cost of current in pence per unit to domestic consumer	1.70	1.25	1.25	2.25	1.25	1.75	
Total cost	£15/7/5	£14/10/7	£16/11/-	£26/11/4	£14/3/5	£25/12/6	
Actual average units used per consumer for all purposes	436	1847	939	793	1218	1306	

NOTE.—A "Degree Day" is the product of the number of days in each month of the heating season multiplied by the difference between the average temperature for each month and 65 degrees (F.).

Table Showing Gas Flow through Nipple Orifices  
GAS AT ORDINARY PRESSURE, VIZ., 3 in. WATER COLUMN PRESSURE

Diameter of orifices (inches)	5/64	3/32	7/64	1/8	9/64	5/32	11/64	3/16	13/64	7/32	15/64	1/2
Approximate flow per hour (cub. ft.) by experiment	18	25.8	32.4	43	54	61	80.5	96	110.4	126	138	163

(Continued on next page)



## SECTION 2

## WATER HEATING WITH GAS

Despite the variety of present-day needs in regard to hot water requirements, gas provides a service which satisfies practically every modern demand and possesses a definite superiority over other methods of heating. Gas-operated water heaters vary in size from a small sink heater—with a capacity of less than a gallon—to a large storage system which supplies hundreds of gallons of really hot water every 24 hours.

These appliances, which are of modern design and construction, are simple, clean and convenient, seldom require mechanical attention and guarantee an instant and regular supply of steaming hot water at all times.

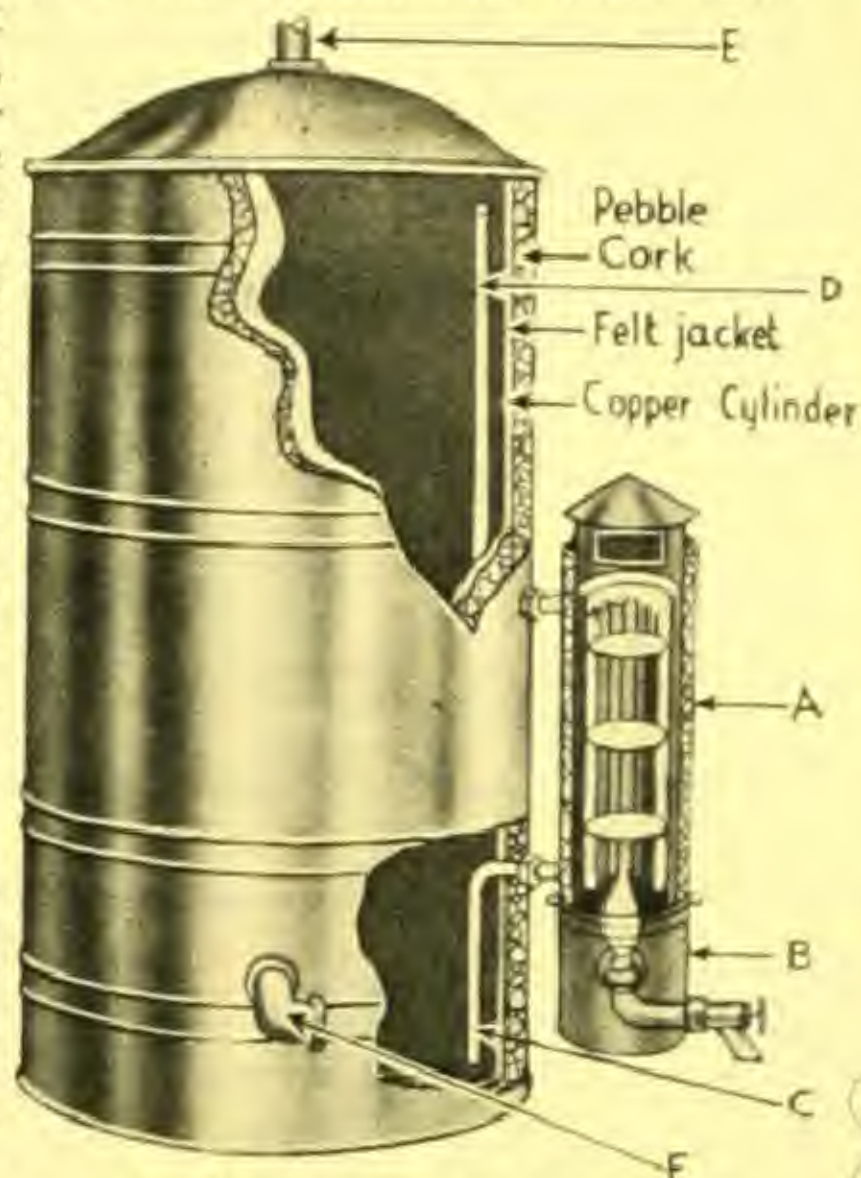
Brief descriptions, and also interesting data in connection with the principal types of gas-operated water heaters, are contained in the following pages.

## GAS OPERATED STORAGE WATER HEATERS

Gas-operated storage water heaters furnish an excellent example of simplified water heating and of the economy with which a complete hot water service can be regularly maintained. These heaters are of two types, viz., continuous and semi-continuous, the use of the one or the other being dependent upon the nature of the hot water demand.

## Continuous Type

This heater—of which the Wee Jet is a typical example—consists of (a) a small heating chamber and (d) a storage boiler. The water is heated in (a) by a small burner (b) consuming from 2 cubic feet of gas per hour upwards—according to the capacity of the system—and flows into the storage boiler (d) at a relatively high speed, producing a thermal circuit and facilitating the heating of the bulk of the water in the boiler. When hot water is drawn off (from e), cold water is admitted into the bottom of the storage boiler (from f), when it passes into the small heating chamber. A special advantage of this heater is that the gas can be raised or lowered to suit variations in the cold water temperature, or to supply water at a higher temperature. The storage tank is heavily insulated with a felt jacket and pebble cork to prevent heat losses and it has no floats, valves or mechanism to get out of order or require attention. No flue is needed and, as the heater is compactly built, it can be readily installed in the kitchen or laundry.



A Diagrammatic Sketch of the "Wee-Jet" Storage Gas Water Heater.

Other gas-operated storage heaters, such as the "Sun-rise," "One Jet" and "Super Heater" embody the same principles of heating as the "Wee Jet" and provide a service equally as satisfactory.

## 25 PER CENT. DISCOUNT OFF GAS USED BY STORAGE WATER HEATERS.

The attention of architects and builders is drawn to the discount of 25 per cent. which The Australian Gas Light Company allows off gas used by continuous and semi-continuous storage heaters.

This discount is granted only in connection with storage installations equipped with a separate gas meter and otherwise in keeping with the Company's requirements.

## Semi-Continuous Type

In this type the heating is carried out intermittently according to the demands made upon the hot water service. An excellent example of this system is provided by the "Briar." This heater differs in principle from the "continuous" type in that the water in the storage tank is heated by a large burner, thermostatically controlled, i.e., the gas is turned on and off as required, and maintains the water in the heater at a constant, pre-determined temperature. When hot water is drawn off, cold water is admitted and the gas is turned on to heat the cooled water; but when the water is again heated to the original point, the gas is shut down until only a pilot jet remains burning.

The special merits of heaters of this type are that they possess maximum flexibility with reasonable supply of hot water. They are specially adapted for hospital wards, tea rooms and such other places where the demands are of a fluctuating nature and very hot water is required.

## Quick Recovery

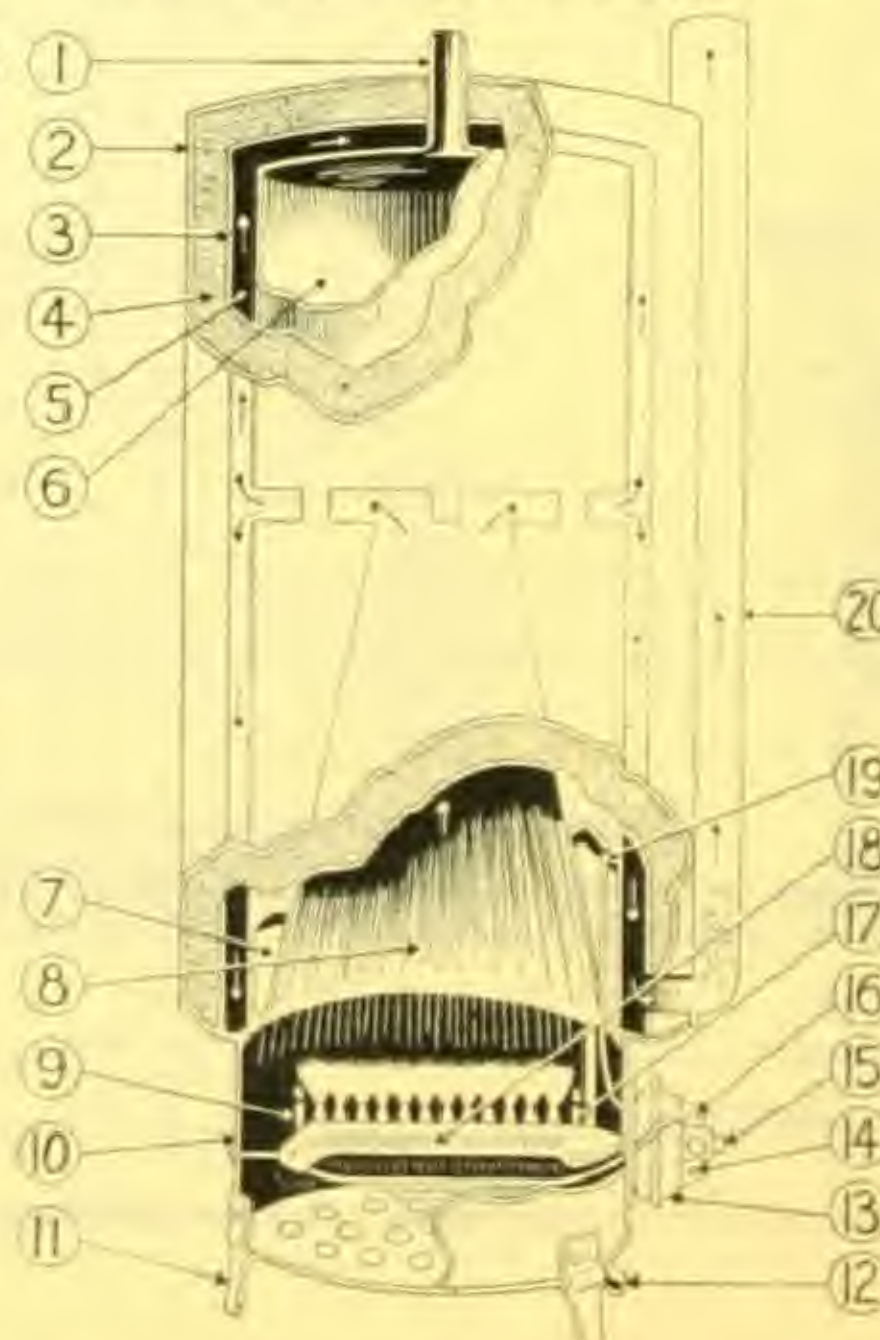
Semi-continuous heaters are noted for their quick recovery, or, in other words, the speed with which they heat the contents of the storage tank after the tank has been emptied. The time required varies according to the make of heater, but it averages approximately 1½ hours.

Other semi-continuous heaters, such as the "Hot Flow" and "Reserve," operate on similar principle, and provide a most satisfactory hot-water service.



An installation of a semi-continuous, gas-operated Storage Heater.

## AN X-RAY DIAGRAM OF THE "BRIAR" SEMI-CONTINUOUS STORAGE HEATER.



- 1-Hot Water outlet pipe.
- 2-Outer case of insulation jacket.
- 3-Inner casing of insulation jacket.
- 4-Cork insulation tightly rammed.
- 5-Heating space round water tank.
- 6-Upper storage tank.
- 7-Lower storage and heating tank.
- 8-Heating chamber.
- 9-Pilot jet.
- 10-Burner box casing nickelled.
- 11-Nickelled legs.
- 12-Cold water inlet.
- 13-Thermostat controlling gas supply.
- 14-Pilot regulating screw.
- 15-Thermostat adjusting screw.
- 16-Pilot supply tube.
- 17-Pilot jet.
- 18-Burner casting.
- 19-Thermostat element tube.
- 20-Flue lead-up pipe.

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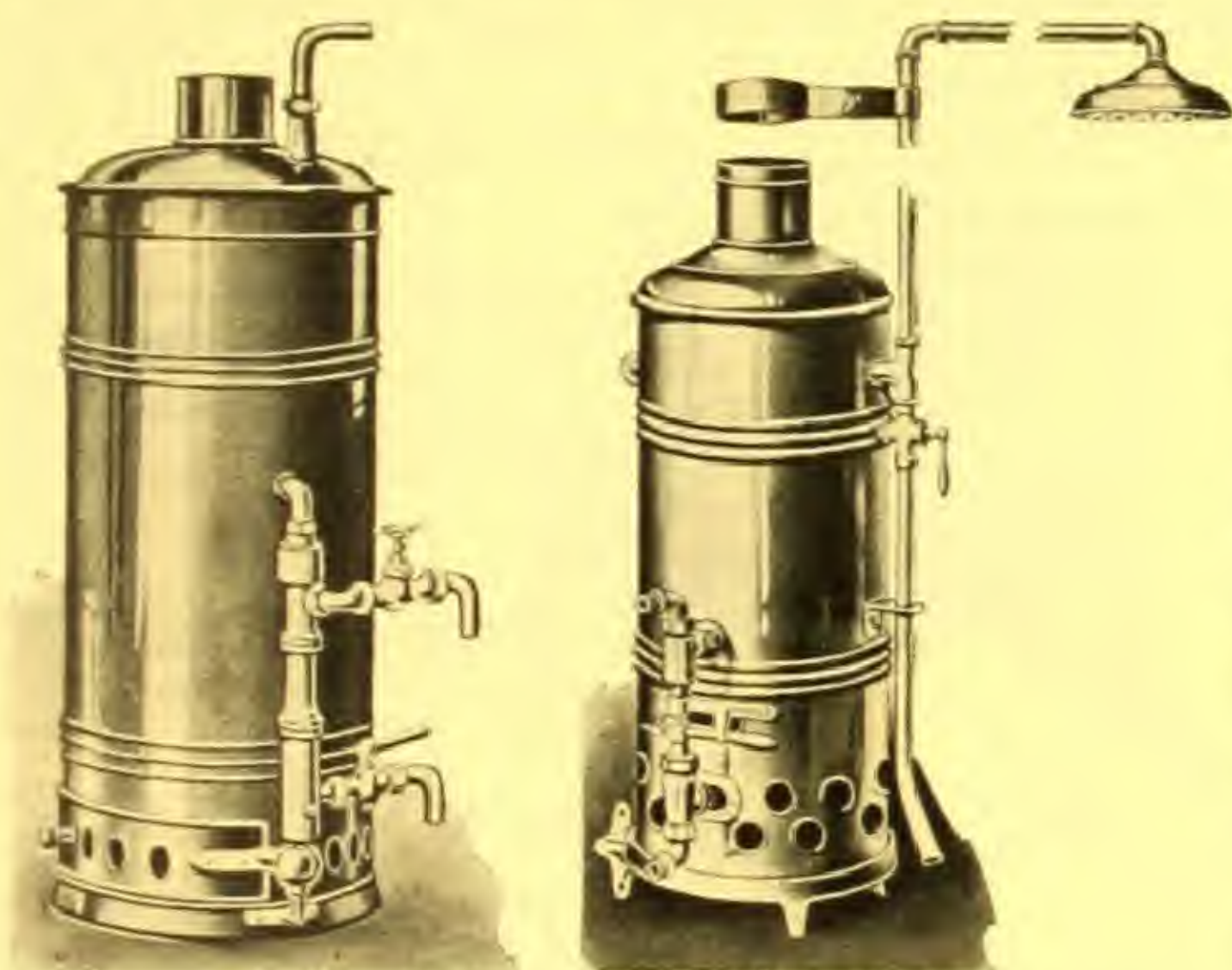


### Service or Multi-Point Heater

The Service or Multi-Point Heater is sometimes described as "practically an extension of the water main in the form of a spiral copper coil with a powerful gas burner at its base." This heater operates on the automatic principle, being fitted with an automatic valve which controls the gas supply when the water tap is open or closed. It is connected direct to the water main and its successful operation depends to a very great extent upon the pressure exerted by the flow of water in the main. Because of the influence of water pressure upon the operation of this heater, it is not desirable to install it in high buildings unless means are provided to ensure a suitable water pressure being maintained.

**Instantaneous Hot Water.**—This heater gives a continuous flow of  $2\frac{1}{2}$  to 4 gallons of hot water per minute and will supply at that rate for as long as hot water may be required. When hot water is not being drawn off, the burner cuts down to a mere trickle of flame, so that the cost of the system is directly proportionate to the quantity of hot water used.

Information regarding the gas consumption, outflow, etc., of well-known Service or Multi-Point Heaters, as supplied by the manufacturer, is given on page 316, and below is an example of a typical model.



Service or "Multi-Point" Heater.

Modern Gas Bath Heater.

Typical Models.

### Gas Bath Heaters

The gas bath heater is almost universally recognised as one of the simplest and most convenient appliances for providing an instantaneous supply of hot water in the bathroom. It is extremely economical and supplies steaming hot water any hour of the day or night, at the turn of the tap. Two main types are used, viz., contact and non-contact, but the latter is considered the more desirable because the heat from the gas flame does not come into direct contact with the water.

Installation work is comparatively simple and also inexpensive, and even a bathroom of small dimensions does not present any difficulty in regard to the fitting up or operation of one of these heaters.

A combination gas and water tap ensures the maximum degree of safety when operating the heater, and the use of non-tarnishing chromium has materially improved its appearance and rendered polishing almost unnecessary.

Gas bath heaters are made in a big range of sizes and the majority of them can be obtained with or without a shower attachment. A popular model, the capacity of which varies from  $1\frac{1}{2}$  to  $1\frac{3}{4}$  gallons per minute, is illustrated on this page.



A Gas Sink Heater.  
Instantaneous Type.

### Gas Sink Heaters

This small heater is invaluable for supplying hot water for the sink and for all other kitchen requirements. It is either automatic or direct controlled, does not require a flue and can be readily connected to both the gas and water services. Two types are available, viz., storage and instantaneous, the latter being similar in all respects to the ordinary gas bath heater, except that it is very much smaller.

Sink heaters are also an economical medium for supplying hot water in dentists' and doctors' surgeries and hairdressing saloons, and for almost every other purpose where hot water is required frequently in small quantities.

In the accompanying illustration one of these handy little heaters is shown fitted in its usual position over the sink.

### Cafe and Restaurant Boilers

These heaters are specially designed to suit the requirements of Cafes, Restaurants and Tea Rooms. They are extremely rapid in action and are particularly suitable for conditions where the demand for boiling water fluctuates widely, being designed for dealing with "rush" periods and "slack" periods alike, with very low gas consumption.

The construction of these heaters is extremely simple, and when hot water is not being drawn off, only an absolute minimum of gas is used—just sufficient to keep the water a little below boiling point.

The cold water supply is automatically controlled by a ball valve, and there is no intricate mechanism to get out of order.

A further development of this type of water heater is the combination hot water boiler, pie urn and hot milk or coffee urn. In this "quick service" appliance the burner under the boiler supplies all the heat required by the boiler, milk urn and pie urn.

Heaters of this type do not require a flue and they can be fitted on counters, benches or stands without cutting away or altering counter tops, etc.



Two Modern Cafe or Restaurant Boilers.

(Continued on next page)



## GENERAL INFORMATION AND USEFUL DATA

Effect of  
Water Temperature  
on Water Consumption

An important feature in connection with the hot water supplies in public buildings, is the effect of water temperature on water consumption. When the water is delivered at a temperature which does not necessitate the addition of cold water, a large amount of water is actually wasted. On the other hand, water delivered at a much higher temperature than that actually required, calls for the addition of cold water. The economical advantages of the latter will be readily appreciated. In this connection it is interesting to observe that gas-operated storage heaters invariably supply water at a temperature far in excess of that suited for personal use.

## Conversion Installations

The conversion to gas of coke or oil, etc., fired water heating systems, whilst it is practicable in some instances, is generally inferior to a complete change over to gas—especially from the point of view of cleanliness, convenience and ultimate cost. The company will be pleased to report and advise upon all matters of this kind.

## Gas Consumption Formula

In order to determine the number of cubic feet of gas necessary to raise a known quantity of water through a known number of degrees, use the following formula:—

$$C. Ft. = G. \times 10 \times D$$

Where: C. Ft. = Cubic foot of Gas.  
G. = Gallons to be heated.  
10. = Because 1 gallon weighs 10 lbs.  
D. = Degrees raised or final temperature, minus initial temperature.  
B. = B.Th.U. Value of Gas.

**EXAMPLE:**  
30 gallons are required to be heated, say, from 60 degrees to 100 degrees F. (or through 40 degrees F.) with gas of 500 B.Th.U., then  
$$\frac{30 \times 10 \times 40}{500} = 24 \text{ cubic feet.}$$

This is the theoretical value and, since heat is lost in waste gases, radiation and absorption by metal parts, the efficiency of the water heater must be known, it is usually between 80 per cent. and 89 per cent.—say it is 85 per cent. Then the actual consumption would be

$$\frac{24 \times 100}{85} = 28.24 \text{ c. ft.}$$

Estimating Capacity of System  
Required

In estimating the number of gallons capacity of a Hot Water Storage System required for any particular job, the following basis may be used as a guide, taking water at a temperature of 160 degrees:—

Bath—15 gallons.  
Shower—1 gallon.  
Hand Basins—2½ gallons per person residing in the house.  
Kitchen Sink—1 gallon per person residing in the house.

## FOR EXAMPLE:—

For three persons, 28 gallons (say 30) would be required.  
For five persons, 36 gallons (say 40) would be required.

## HOT WATER FOR HOSPITALS

(Results given by Briar Heaters)

Maternity Hospital—A Three-storey Building containing 60 Beds.

The hot water for distribution throughout the building is supplied from two fifty-gallon Briar Heaters. These are thermostatically controlled, and operate continuously day and night, the points supplied with hot water being:—

5 Showers; 5 Baths; 12 Basins; 3 Sinks; 2 Sterilizers.

In addition to the Briar Heaters, there are four large sterilizers, three small sterilizers and six rings, all independently heated by gas.

During a twelve months' period the gas used for all the above purposes averaged 3,462 cubic feet per day, equivalent to 144 cubic feet per hour. Of this amount, approximately 1,367 cubic feet is used by the Briar Heaters.

The demands for hot water in this hospital are particularly heavy.

Hot Water Demand  
Should be Carefully  
Analysed

The hot water demand, not only in terms minimum and maximum quantities per 24 hours, but also in relation to individual uses throughout the 24 hour cycle, should be carefully computed and analysed. If this is not done there is always a danger of installing an appliance which is totally inadequate for the purpose, or, on the other hand, far too large and consequently a good deal more costly than the circumstances warrant. An analysis of the hot water demand has the further advantage of indicating the type of appliance most suitable for the job.

## Classification of Gas-Operated Water Heaters

Type	Supply	Operation
<b>Central Systems.</b>		
Storage Heaters, Continuous	Complete hot water service	Automatic
Do. Semi-continuous	Complete hot water service	Automatic
<b>Instantaneous.</b>		
Service and Multi-Point Heater	Complete hot water service	Automatic
Bath Heater	Bath and Shower	Manual control
Sink Heater	Kitchen Sink	Automatic and manual control
Cafe and Restaurant Boiler	Hot water for Cafes, Restaurants, etc.	Automatic

## Useful Data

One British Thermal Unit represents the heat required to raise 1 lb. of water 1° (F.).  
One gallon of water weighs 10 lbs.  
3,412 B.Th.Units = 1 Board of Trade unit, which equals

1 KW  
or  
1,000 Watts } for one hour, i.e., "Kilowatt hour."

1 Board of Trade Unit, or 1 KW, or 3,412 B.Th. Units = 1 Electrical Unit.

500 B.Th. Units (net) are contained in 1 cub. ft. of gas as supplied by the A.G.L. Co.

## Formula for Hot Water Supply

Lbs. weight of water x degrees rise in temp. (F.) = B.Th. Units required—

For Gas Estimations—

B.Th. Units reqd.  
500 = Cubic feet of gas required.

For Electrical Estimations—

B.Th. Units reqd.  
3412 = Electrical Units required.

Ex.—1 gal. from freezing (32°F.) to boiling (212°F.) =

10 x 180 = 1,800 B.Th. Units, or

1800 = 0.53 Electrical Units.

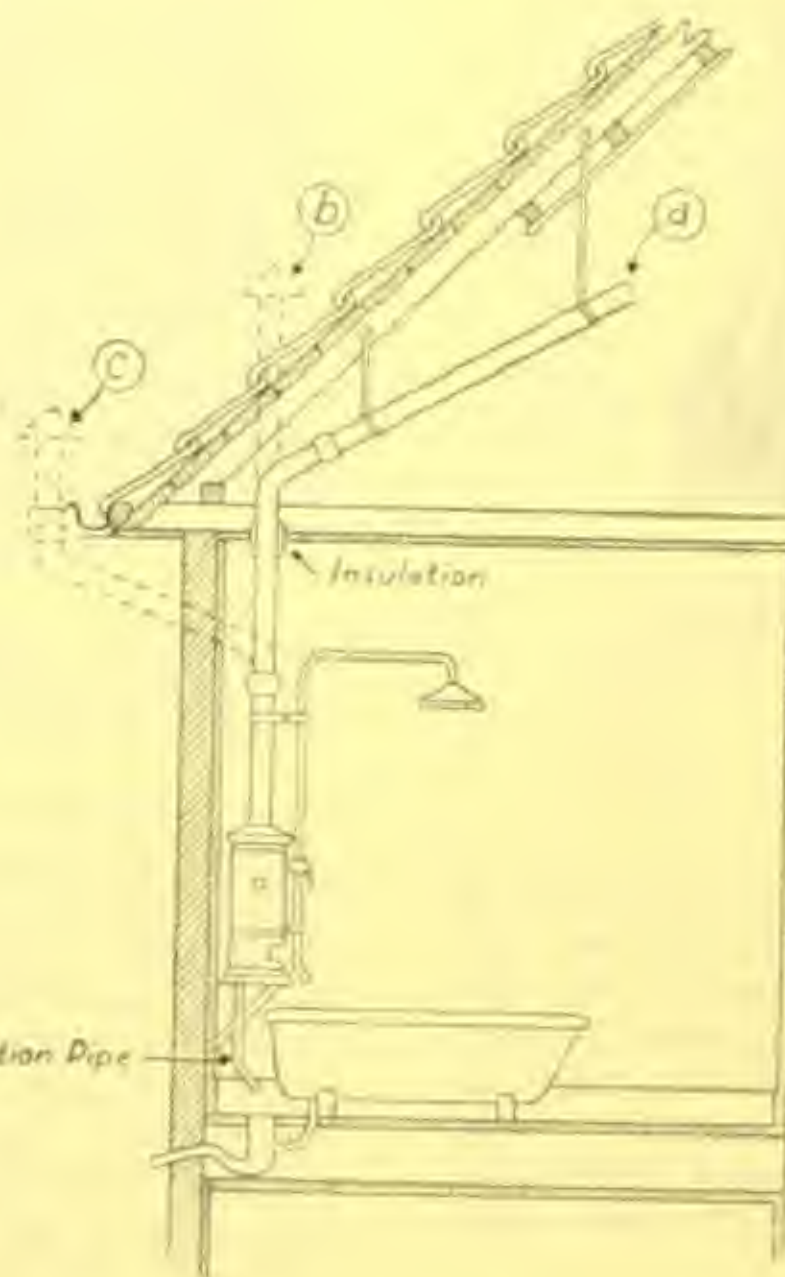
1800 = 3 3/5 cubic feet of gas.

500

The minimum price of electricity for domestic purposes is 1½d. per unit.

The price of Gas in Sydney is 5/9 per 1,000 cubic feet, or 14½ cubic feet for one penny.

(Continued on next page)



Alternative Methods for Installing  
Flue Pipe to Bath Heater.

- Terminated in Roof Space.
- Carried through roof—to end in suitable terminal.
- Carried through wall—to end in suitable terminal.



## SECTION 3

## ROOM HEATING WITH GAS

## The Modern Gas Fire

With its radiant sunlike warmth and regular ventilating action, the modern gas fire provides a system of room warming which is infinitely more healthful and hygienic than that of other heating

appliances. This cosy fire carries the endorsement and recommendation of leading medical experts, and is used by thousands of doctors and also by many hospitals, and Government offices.

## Healthful Warmth

It has been definitely established by medical science that the radiant heat from a gas fire very closely resembles the heat rays from the Sun. Careful tests have shown that the infra-red rays from the modern gas fire pass through the skin without causing the slightest irritation or discomfort and are absorbed by the blood stream. In other words, their action upon the body is exactly the same as the heat from the Sun.

## A Definite Aid to Ventilation

Of equal importance is the ventilating action of the fire. As the fire burns, heated air passes up through the chimney or flue. This automatically sets up a flow of fresh air into the room and thus establishes a system of ventilation in which there are no draughts and the air in the room is kept in regular circulation and also changed at frequent intervals. Some gas fires change the air in the room as often as six times an hour, whilst even the smallest type provide a sufficient number of changes of air to prevent it becoming vitiated. Combustion is perfect, for, as searching scientific tests have shown, no fumes or odors are produced.

## They Do Not Dry the Air

Unlike most other room heaters, the modern type of gas fire does not dry the air, the incoming fresh air keeping the humidity at normal level. It is for this reason that the air in a room where a gas fire is used never gets "heavy" and oppressive and does not cause irritation to the nose, throat or eyes. As the maintenance of normal conditions regarding humidity is one of the most desirable features in room warming, this fire warrants special consideration.

Leading medical and scientific authorities have said "the modern gas fire is one of the most hygienic room heaters in existence and it provides a system of ventilation which is even better than an open window." In Great Britain this system of heating is very widely used, and it is interesting to note that in London alone more than 5,000 medical men, as well as 90 per cent. of the public hospitals, day nurseries, creches and nursing homes, etc., heat their rooms with gas.



A Popular Model — especially suited for Ordinary Grates.



A Unique Design in Modern Gas Fires—particularly suitable for Open Fireplaces.



A Classic Model—typifying some of the latest ideas in design and finish.

## Many Styles

In the manufacture of modern gas fires special attention has been given to architectural requirements. Many different models are available and they are made in types which are specially adapted for:—Old-fashioned fireplaces, register grates; modern styles of fireplaces and even rooms in which there is no fireplace. The use of several different finishes in colour preserves harmony in furnishings and materially assists in the general scheme of interior decoration, etc.

## Remarkably Economical and Wonderfully Cosy

Two of the most striking features of this method of heating, apart from those already described, are the bountiful warmth—which literally floods the whole room—and the small fuel cost. For the average size room the cost is as little as 1¼d. an hour, or less than half the cost of electricity. In support of this it may be mentioned that with gas at 5/9 per 1,000 cubic feet, one penny buys 7,500 units of heat, whereas with electricity at the very lowest domestic rate, viz., 1¼d. per unit, one penny buys only 2,728 units of heat. The economical advantages of the gas fire are evident at a glance.

## Easy to Install—Special Types

In dwellings equipped with a suitable chimney or flue, and which are already piped for gas, a gas fire—appropriate to its surroundings—can be readily installed at a comparatively small cost. Where no chimney or flue outlet is available, a specially designed "built-in" type of gas fire can be installed with a minimum amount of alterations to walls, etc. In the case of ordinary grates—a different type of fire—also specially designed—can be easily fitted. It will be seen, therefore, that with very few exceptions, this hygienic and thoroughly economical system of room-warming can be readily used. The illustrations appearing on this page show four distinct types of modern gas fires, each designed to suit a particular class of setting. Interesting information and data regarding these, and all other gas fires, will be willingly supplied.



A Modern Gas Fire—"Built-in" Type—(at left). Specially adapted for rooms in which there is no fireplace.

(Continued on next page)



## GAS STEAM RADIATORS

The gas steam radiator provides an excellent system of heating for public buildings, schools, colleges, churches, and is in many respects superior to a central heating system. Several different makes of gas steam

radiators are on the local market, some of them of long standing, others of more recent introduction to Australia, but, generally speaking, they embody one basic principle of heating.

## Construction and Operation

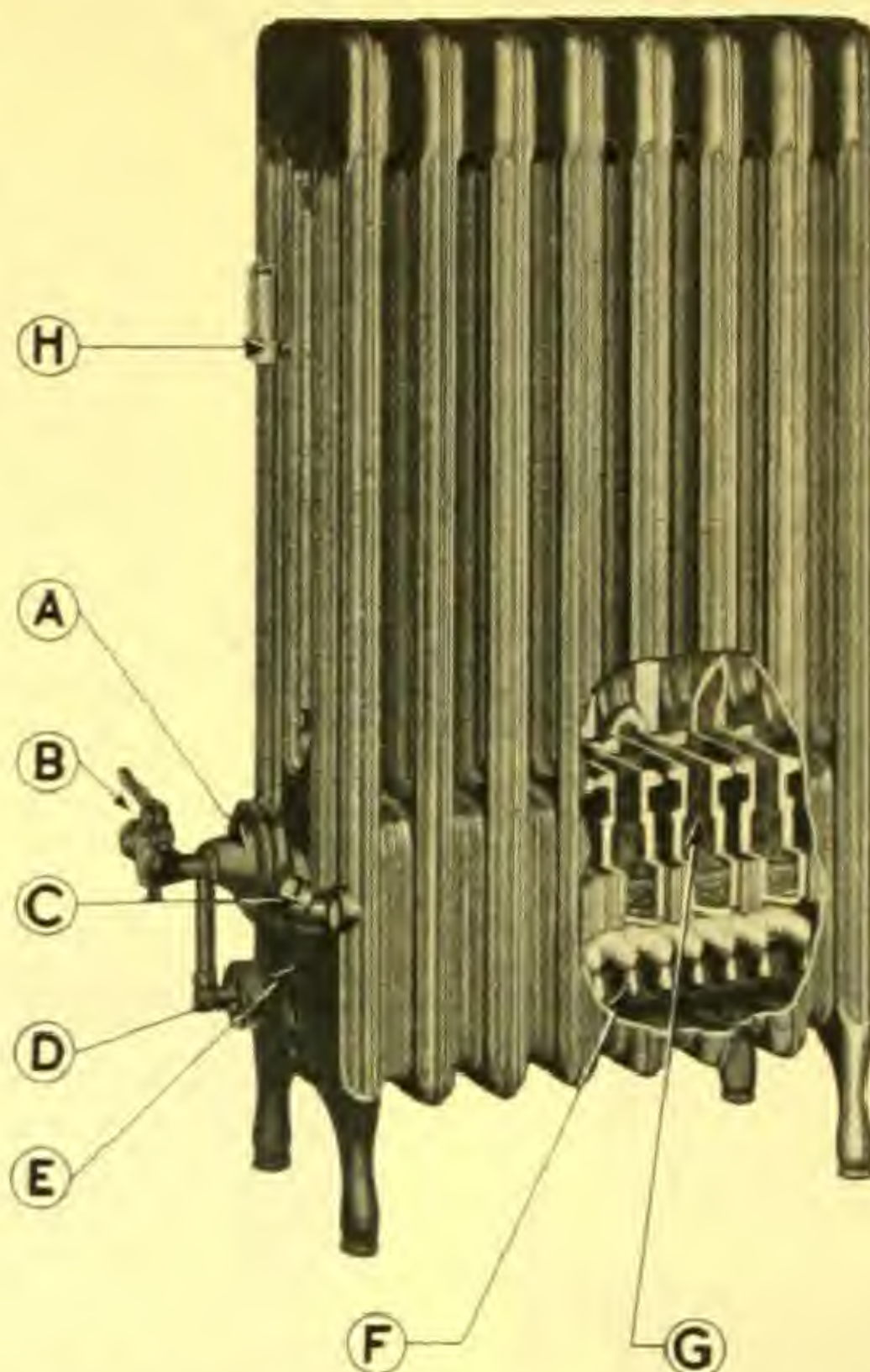
These radiators consist of a series of columns—as shown in the diagrammatic sketch—which are connected to a common bottom chamber and are joined together at the top. Water is introduced to the bottom chamber, beneath which is a row of specially designed bunsen burners. As steam is generated, the air in each loop is expelled through a vent. As the temperature in the radiator rises, the steam-heated columns impart warmth to the adjoining air and set up a gentle motion in the air.

## Automatic Control

The volume of gas supplied to the burner is controlled by an Automatic Regulator actuated by the pressure of the steam in such a manner that when steam has been generated to a suitable pressure the volume of gas is automatically reduced so as to allow only sufficient gas to be supplied to maintain the required steam pressure. This renders a dual service, viz., it keeps the gas consumption down to a minimum and prevents overheating.

## Safe

The combustion chamber is cast integral and it is designed of sufficient size to prevent any impingement of flame on iron, thereby ensuring absolute safety and no possible risks of fire danger. There is no condensation or drip from these radiators and even



A Diagrammatic Sketch of a Modern Gas Steam Radiator.

A—Automatic Steam Regulator; B—Gas Cock; C—Filling Cup; D—Main Orifice Ell; E—Lighting Opening; F—Burner; G—Steam Columns; H—Air Valve.

when in constant use it is only necessary to replace the water at intervals of from 6 to 12 months. A safety valve prevents excessive steam pressure in the radiator.

## Economical

As only a small quantity of water is required in these radiators the quantity of gas used is comparatively small. On the other hand, the Automatic Regulator ensures that no more gas than that actually required will be consumed.

## Location of Radiator

To ensure perfect combustion and to obtain maximum efficiency in regard to the circulation of heated air these radiators should be installed in the vicinity of windows, or along an exposed wall, so that cold draughts will be warmed on entering the room.

## To Determine Size of Radiator Required

To determine the size of radiator required to heat a room the following simple method can be adopted. Take cubical content of room in feet, add on one-third and divide the result by 100. This will give the radiation feet. To find the size of radiator required it is necessary to consult one of the charts issued by manufacturers of these radiators, as the equivalent feet of radiation varies according to the height and width of radiators.

## SECTION 4

## GAS IN THE LAUNDRY

Although clothes washing has been brought to a stage of mechanisation per medium of washing machines, the modern gas copper and the associated washing tubs still maintain definite advantages over the mechanical method, especially as regards convenience and operating cost.

The gas copper is one of the simplest and one of the most serviceable of all gas appliances. It can be fitted in almost any laundry, takes up very little space, can be used at a moment's notice, and costs only 4d. to 6d. for gas for the average week's washing.

## TWO TYPES

Gas coppers are made in two types, viz., packed and unpacked, and of these the former is the more efficient and consequently cheaper in the end. They can be obtained with or without a draw-off tap, but because of its great convenience the former are generally preferred.

## MODERN FINISHES

With the introduction of the new mottled enamel—which is heat-proof and crack-proof—the external appearance of gas coppers has been completely transformed and it is now possible to secure them in a number of pleasing finishes.



Gas Copper (Packed Type).



Gas Copper (Unpacked Type).  
New Mottled Enamel Finish.



## SECTION 5

## REFRIGERATION BY GAS

Freezing with heat, however contradictory it may seem, is one of the latest and most noteworthy achievements in regard to the use of gas, and is yet another example of the versatility of this dependable clean fuel.

By the ingenious use of a simple chemical process,

a most efficient system of gas refrigeration has been evolved. This system, which is exemplified by the Electrolux Gas Refrigerator, possesses three notable features, viz., it is perfectly silent and vibrationless, it has no mechanism or moving parts, and it operates at a very low cost.

## A Tiny Gas Flame does all the Work

Its simplicity is nothing short of amazing. A tiny gas flame takes the place of all mechanism and does practically all the work. The heat from the gas flame—which is scarcely any bigger than a pilot light—changes the refrigerating liquid to vapour. A trickle of water changes it back again to liquid. This endless cycle of physical changes produces intense dry cold. There is nothing to go wrong and nothing to oil, repair or replace. The refrigerating liquid is hermetically sealed away for the life of the refrigerator. It does not deteriorate and it cannot leak out.

## Endorsed by Leading Architects

Architects throughout Europe and U.S.A. have examined the Electrolux Gas Refrigerator thoroughly and never before have they received a new product so enthusiastically. In U.S.A. the number of gas-operated refrigerators now in use exceeds 100,000. "London Terrace," New York, the largest apartment building in the world, is equipped with 1,669 Electrolux Gas Refrigerators—one in every kitchen—and in scores of other buildings the number of these refrigerators exceeds the 50 mark.

In this refrigerator, "heat power" displaces motive action. Instead of the monotonous sound of a whirring, droning motor, everything is still and perfectly silent. Once the gas is lighted the freezing action starts—to continue endlessly. Should the flame go out the freezing action stops, but no damage is done. The gas automatically shuts off and cannot flow again until the burner is lighted.



The Gas-Operated Electrolux Refrigerator—Standard Model.

It will be noticed that the freezing unit occupies very little space and that the food chamber is particularly large. Trays for making ice are shown at the top right hand side. These trays can also be used for making delicious ice cream.

## Perfect Food Preservation

Foods are kept in a perfect state of preservation by the intense, even dry cold of this refrigerator. Temperature fluctuations, which are almost inseparable from other types of refrigerators, are prevented by a device which automatically regulates the heat, and so keeps the temperature of the food chamber practically at one level day in and day out.

## Easy to Instal

Both the gas and water connections required are of the small type, so that the cost of installing the Electrolux Gas Refrigerator is negligible. Being compactly designed, this refrigerator requires a limited amount of floor space and can, therefore, be conveniently fitted in almost any kitchen.

## Cheaper than other Refrigerators

The Electrolux Gas Refrigerator has set a new low level in the cost of home refrigeration—the weekly cost of gas needed being only about 2/-. This represents the full operating cost, as there is nothing to oil, wear, or repair, and the refrigerating liquid does not deteriorate or require renewal. As the average ice chest involves a weekly outlay of 3/- to 4/- a week, it will be seen that home refrigeration with gas is, like cooking and heating with gas, a definite form of domestic economy.

## SECTION 6

## INCINERATION BY GAS

Health requirements, coupled with the growing needs of modern building schemes, render it desirable, if not necessary, that refuse from dwellings—and more especially kitchen refuse—be disposed of frequently by hygienic means. In other parts of

the world domestic incineration has become firmly established and it is making rapid yearly progress. Here in Australia it is not as yet very widely used, but the idea is rapidly gaining favour.

*(For continuation of this Section see page 483 where further complete information is available)*

*(Continued on next page)*



## SECTION 7

## GAS APPLIANCES FOR HOTELS, CAFES, RESTAURANTS, ETC.

These appliances, which are termed "heavy duty" because of the type of service they provide and also to distinguish them from domestic appliances, cover almost the entire group of cooking and heating equipment for business purposes. They are specially

designed to supply what might well be termed "bulk demand" and are made in types and sizes to suit the particular requirements of Hotels, Cafes, Restaurants and Boarding-Houses.

## Practical Advantages

The advantages of "heavy duty" gas appliances may be grouped under three headings, viz., structural, technical and economical. Requiring neither substantial foundations nor solidly built chimneys, those used for cooking can be installed at practically no structural expense and in locations where the use of most other appliances would involve considerable expense or, on the other hand, be out of the question. In addition, they permit of increases in capacity or output without disturbance to appliances already in use.

Storage space for fuel, and provision for the handling and disposal of ashes are dispensed with altogether. These appliances, therefore, simplify and cheapen the cost of buildings in which foodstuffs are cooked on a large scale.

The technical advantages include: instant and regular supply of fuel, perfect heat control, simplicity of operation, sturdy construction, and high heating efficiency.



Combination Gas Hot Water, Tea and Coffee Urn.

## An Aid to Architects and Builders

The whole tendency of "heavy duty" gas appliances is in the direction of simplification and improved results, and architects and builders will frequently find that many an otherwise stubborn problem in connection with the installation of cooking or heating equipment has a ready solution in these modern appliances.

More hotels, cafes and restaurants than ever before are entrusting their cooking and heating to gas, not merely because it is better and cheaper than other methods, but—in very many cases—because it means modernisation without heavy building or remodelling costs.

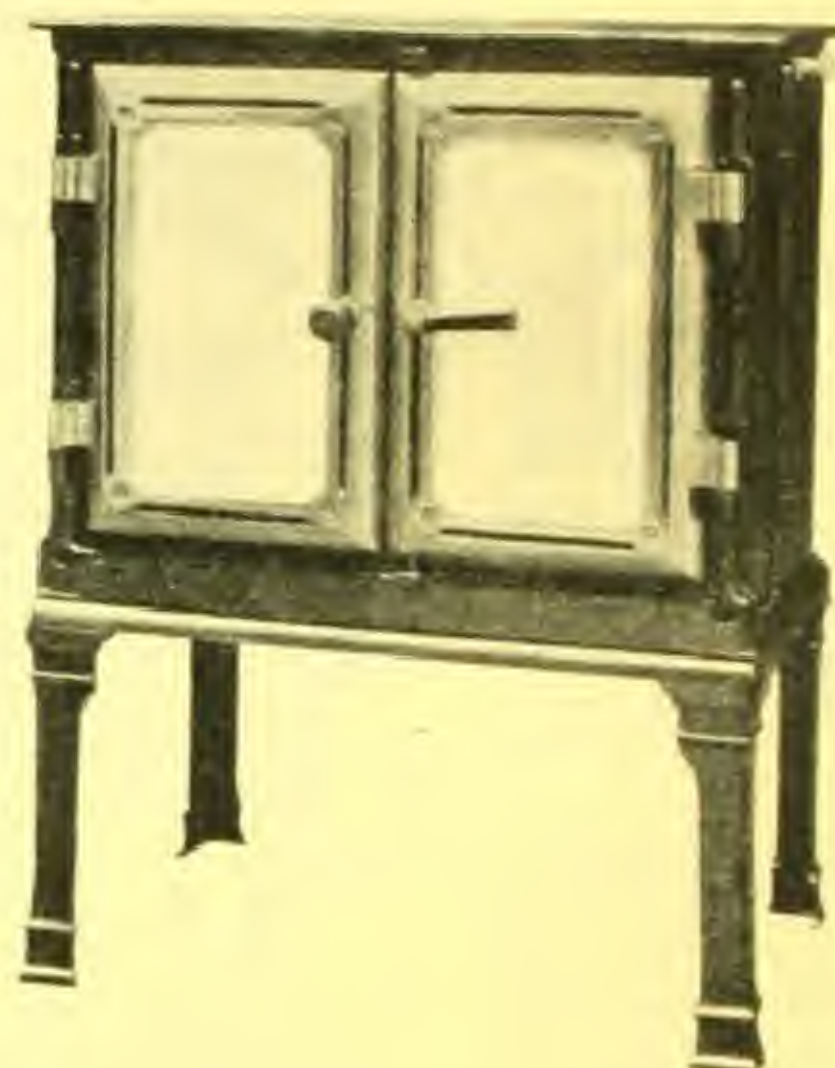
## Appliances for Every Kind of Heating

"Heavy Duty" gas appliances include:— Cooking Ranges, Cafe Ovens, Hot Plates and Toasters, Hot Presses, Serving Tables, Stock Pots, Vegetable Steamers, Hot Water Systems, Urns, Boilers, etc.

The Australian Gas Light Co. will gladly furnish complete particulars in connection with the installation, use and operation of these up-to-date appliances.



A Gas Hot Press. Porcelain Enamelled Finish.

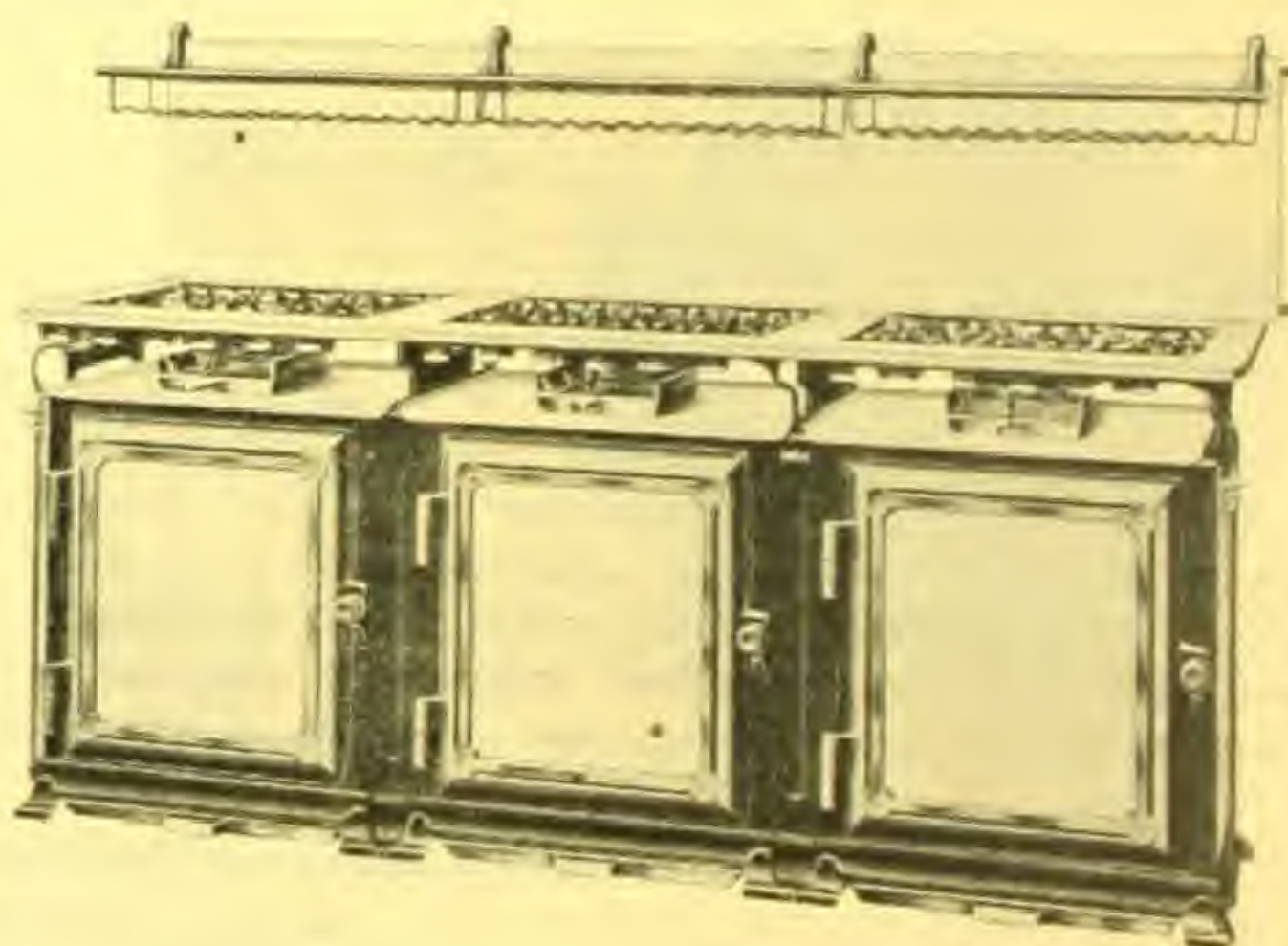


(at right)  
Modern Gas "Cafe" Oven.



Gas-Heated Vegetable and Pudding Steamer. (at left)

A Modernly-Designed Triple Oven Gas Range. (at right)



(Continued on next page.)



## SECTION 8

## INDUSTRIAL HEATING WITH GAS

The phenomenal growth of gas in industries during the last decade is one of the most outstanding developments in the industrial heating field. This modern method of heating received a tremendous impetus during the Great War and since then it has made such rapid progress that to-day there is scarcely an industrial heating process in which gas cannot be used with equal, if not greater, success than any other fuel. Its uses already number many thousands and they are being added to almost every day. Amazing growth in the use of industrial gas has taken place in Sydney metropolitan area. Since 1922 the number of industrial users has grown from approximately 200 to over 1,500 and the annual consumption of gas has increased from 29,200,000 cubic feet to 427,316,000 cubic feet.

Gas is pre-eminently the controllable fuel and this one factor alone has been responsible for its adoption in factories, etc., where precise heating temperatures are the very foundation of manufacturing success. Its unfailing reliability makes its use desirable in almost every heating plant, whilst its extreme cleanliness, simplicity and convenience give it definite and commanding advantages over those forms of heat which create smoke and dirt and require to be handled and stored. Important also are the capital

savings brought about by using modern gas-heated equipment. Chimneys are done away with, heavy and usually expensive structural work is not required, building space and also floor space are conserved, fuel storage accommodation is no longer needed and factory design can be developed along the most modern lines, particularly in relation to light, ventilation, cleanliness and labour saving. The smoke nuisance—one of the legacies of wasteful coal burning and also a health impairing agency—diminishes in exact ratio to the number of industrial gas appliances installed. Viewed, therefore, in rational light the use of gas in industries is something which should be encouraged and supported by the entire community.

## An Up-to-Date Heating Service

The Australian Gas Light Company maintains a most up-to-date Demonstration Section in which all modern types of industrial heating appliances are displayed and demonstrated. A staff of experienced technical experts is constantly employed and these officers will investigate the heating problems of manufacturers and furnish assistance and advice on all aspects of industrial heating. Architects and contractors are invited to consult our Industrial Fuels Department whenever they require information or advice regarding the installation of heating equipment.

## SECTION 9

## TESTING LABORATORY

A development of more than usual interest to architects and users of gas generally is the inauguration of a Testing Laboratory by the N.S.W. Commercial Gas Association. This Testing Laboratory is the first of its kind to be established by the gas industry in the British Empire and its principal purpose is to determine, by recognised standard tests, the efficiency and safety of all kinds of gas appliances. Definite standards in connection with efficiency and safety have been laid down and a model of each appliance is tested. Appliances which fail to pass the prescribed tests, or to satisfy the standards, will in future not be sold by gas undertakings in New South Wales. Every gas appliance



"Seal of Efficiency"

which satisfactorily passes the Laboratory tests, etc., is issued with the Seal of Efficiency—a metal badge bearing the words "Seal of Efficiency—Testing Laboratory," and this Seal is affixed to the appliance. This hall-marking of appliances, which came into effect on June 1, 1931, furnishes an identification mark whereby efficient gas appliances can be readily recognised. Architects, builders, and users of gas are, therefore, asked to bear in mind the significance of this Seal and to buy only appliances carrying this hall mark. They are asked to communicate with The Australian Gas Light Company should they require information regarding any gas appliance which does not bear the "Seal of Efficiency."

## COMPARISON OF FUELS

RESPECTIVE CALORIFIC VALUE OF VARIOUS FUELS, EXPRESSED IN BRITISH THERMAL UNITS, TOGETHER WITH COST PER B.O.T. UNIT.

	Assumed B.T.U. Value.	Assumed Price.	Price per B.O.T. Unit of 3,412 B.T.U.'s.
<b>GAS—A.G.L.:</b>			
Minimum Industrial	540 per c. ft. gr.	3/8.35 1,000 c. ft.	.280d.
Continuous Water Heating	540 per c. ft. gr.	4/3.75 1,000 c. ft.	.327d.
Average Industrial	540 per c. ft. gr.	4/7.4 1,000 c. ft.	.35d.
Domestic	540 per c. ft. gr.	5/9 1,000 c. ft.	.434d.
<b>LIGHT OILS:</b>			
Kerosene	170,000 per gal.	1/- per gal.	.240d.
Kerosene	170,000 per gal.	2/- per gal.	.480d.
Petrol	165,000 per gal.	2/3 per gal.	.555d.
<b>ELECTRICITY—CITY COUNCIL:</b>			
Minimum Industrial	3,412 per unit	.4d. per unit	.4d.
Continuous Water Heating	3,412 per unit	.5d. per unit	.6d.
Average Industrial	3,412 per unit	1d. per unit	1d.
Large Departmental Stores and Establishments	3,412 per unit	2d. per unit	2d.
Large Residential Consumers, including Institutions	3,412 per unit	2d. per unit	2d.
Small Residential Consumers	3,412 per unit	2½d. per unit	2½d.
Small Shopkeepers	3,412 per unit	3½d. per unit	3½d.
Maximum Domestic (Primary Units)	3,412 per unit	5d. per unit	5d.
Domestic (Balance of Units)	3,412 per unit	1½d. per unit	1½d.

NOTE.—In this Table the Unit used for comparison—the B.T.U. Unit—is equal to 3,412 B.T.U.'s.

(Continued on next page)



## SECTION 10

## SERVICE TO ARCHITECTS, BUILDERS AND OTHERS

"Good Public Service," the motto of The Australian Gas Light Company and the animating principle of its public policy, is well exemplified by the up-to-date facilities it has provided for supplying

expert advice and assistance, and for disseminating information regarding the supply of gas and use of this dependable fuel.

## Showrooms

Modern gas appliances for cooking and every kind of heating are displayed and demonstrated, in a practical way, in well-appointed showrooms, and similar facilities are provided in several suburban centres. Only the goods of reputable makers are handled, and the prospective buyer has the unique opportunity of seeing all makes of gas appliances under one roof. Model rooms illustrate the modernity of gas and its outstanding utility for cooking, water heating and room warming, and in a specially equipped "Hot Water Section" many of the latest types of gas-operated water heating systems can be seen in operation.



A Section of the A.G.L. Coy.'s Showroom.

## Technical Service

Technical advice and assistance is provided by a staff of experienced experts. The service rendered by this staff is of a most comprehensive nature and includes the supply of information regarding the design, construction, installation and use of all kinds of gas-using equipment. Architects and builders are asked to consult our heating experts whenever they desire particulars of any kind in regard to the use of heat for any purpose whatever.



Model Kitchen  
(at left).

Model Bathroom  
(at right).

Modern Laundry  
(below).

The A.G.L. Coy.'s  
Showroom.



## A Complete Industrial Service

The Australian Gas Light Company's Industrial Fuels Demonstration room is completely equipped in regard to both appliances and staff. Advice and assistance on all kinds of industrial heating problems are furnished by experts; demonstrations of practically every kind of heating processes are carried out free of cost, and our experts undertake to design, install and service gas-heating equipment for almost every class of work.



Sizes of Meter and Service Pipe  
Required for Different Combinations  
of Gas Appliances.

Appliances.	Service Pipe, Meter.
1—Cooker	1 in. 5 ft.
2—Cooker and Bath Heater	1 in. 10 ft.
3—Cooker and Copper	1 in. 10 ft.
4—Cooker, Bath Heater and Copper	1 in. 10 ft.
5—Cooker, Bath Heater and Fire (1)	1 in. 10 ft.
6—Cooker, Copper and Fire (1)	1 in. 10 ft.
7—Cooker, Heater, Copper and Fire (1); (1 in. would carry it)	1 1/4 in. 10 ft.
8—Cooker, Heater, Copper and Fire (2)	1 3/4 in. 20 ft.
9—Gas Ring	1 in. 5 ft.
10—Griller	1 in. 5 ft.



G  
A  
S

## Appliances

## THE METROPOLITAN GAS COMPANY

196 FLINDERS STREET, MELBOURNE

SHOWROOMS: 2nd FLOOR.

TEL. C. 8162 (9 Lines)

## SUBURBAN DEPOTS:

Armada  
Caulfield  
CollingwoodCarlton  
Clifton Hill  
CamberwellEssendon  
Glenferrie  
MorelandMoonee Ponds  
Preston  
RichmondSt. Kilda  
South Melbourne  
Windsor

Also at Glenhantly Road, Caulfield.

29f

S.A.A. File No.

## GAS—The Fuel of Today

In the home, as in industry, Gas is the ideal fuel for all heating processes. Invisible, yet ever present, it is ready for instant service, day or night, simply at the turn of a tap. Gas has come to mean Conservation. In the manufacture of Gas every constituent of the raw material—coal—is saved, and thus a great natural resource is conserved. In the use of Gas there is no waste, labour is saved, and the burning of gas eliminates smoke, lets the sun shine in our cities, promotes cleanliness with all its benefits, and thereby conserves health and life. "The Age of Gas" is with us—a conservator and blessing to mankind.

## The Metropolitan Gas Company

is willing and anxious to render any assistance possible and to co-operate with Architects in every way in reference to gas service, gas appliances and their installation.

## Domestic and Industrial Appliances Stocked

Gas Cookers  
Bath Heaters  
Storage Water Heaters  
Hot Water Services  
Gas Coppers  
Radiant Fires  
Radiators  
Every kind of Burner  
Lighting Equipment  
Hot Water Urns  
Toilet Stoves

Heavy-Duty Gas Cookers  
Gas-Steam Boilers  
Gas Furnaces  
Heating Stoves  
Gas-Steam Radiators  
Air Compressors  
Tinmans' Stoves  
Confectioners' Stoves  
Cafe Fountains, and  
Special Burners of  
every description.

## DOMESTIC

## Gas Cooking Stoves

At our showrooms we are displaying the largest variety of Gas Cookers—over 50 varieties—upright and elevated types, in nickel and enamel, or the new coloured porcelain enamels, fitted with pilot lighters, oven heat regulators, oven thermometers, etc., as required.

We have Frontline, Metters' and Parkinson's Cookers in sizes and finishes to meet every requirement. The ovens are well insulated and enamel lined; all are fitted with "high efficiency" burners, complete oven equipment, and are subject to the service of free inspection and attention to burners at any time.

## Gas Fires

Modern Radiant Gas Fires of improved type are available in sizes to suit every need—finished in best art black, art bronzes, and coloured porcelain enamels. Suitable for fitting into register grates, wall grates, or against tiled facings.

## Gas Coppers

The Gas Copper is a necessary adjunct in every up-to-date laundry, eliminating the dirt, smoke and drudgery associated with old-time copper fires. Finished in galvanised, white enamel, or dapple grey enamel, and complete with tap for emptying. Strongly constructed, with seamless copper pan, galvanised heat casing, and mounted on strong cast-iron legs, they are available in 12, 14, and 16 gallon sizes. Space required, 24 in. wide (12 gallons).

## Space Required for Gas Cookers

The following recess spaces are required for—

Upright Cookers—from 24 in. to 33 in. in width;  
Elevated Cookers—from 42 in. to 56 in. in width;  
according to size of cookers.

A depth of recess of 22½ in. is sufficient. Height of opening—5 ft. average.

## ARCHITECT'S SPECIFICATION

The contractor shall arrange with the Gas Company for the installation of gas service pipe of sufficient capacity to adequately provide for all requirements.

Note.—Service should not be less than 1 in. diameter.

## INTERNAL PIPING.

Internal piping shall be constructed so as to be durable, substantial gastight, and of ample size for purposes required, using only best quality iron piping and fittings, etc. Piping should not be laid under tile, parquet or mosaic floors where it is at all possible to avoid it. If this is necessary, the size of piping should be doubled. Tees should be used instead of elbows to facilitate clearing of stoppages, and all pipes should be laid with a fall to the meter, wherever possible.

Note.—A schedule of fittings and equipment should also be provided.



(Continued on next page)

RAMSAY'S CATALOGUE



### Heavy Duty Ranges

Gas is the accepted fuel for all commercial cooking purposes because of its reliability, economy, cleanliness and general efficiency. Of a total of 507 establishments in the Melbourne City boundary, 496 use gas, 225 to the exclusion of all other fuels, and in only 10 cases are other fuels used to the exclusion of gas. We supply a full range of Heavy-Duty Ovens, Boiling Tables, Cake-baking Ovens, Gas Vegetable Steamers, Grillers, Toasters, Muffin Plates, Hot Presses—plain and with bain maries, Stock-pot Boilers, etc., etc. A complete illustrated catalogue, giving dimensions and prices, will be gladly supplied on request.

### Planning and Advisory Service

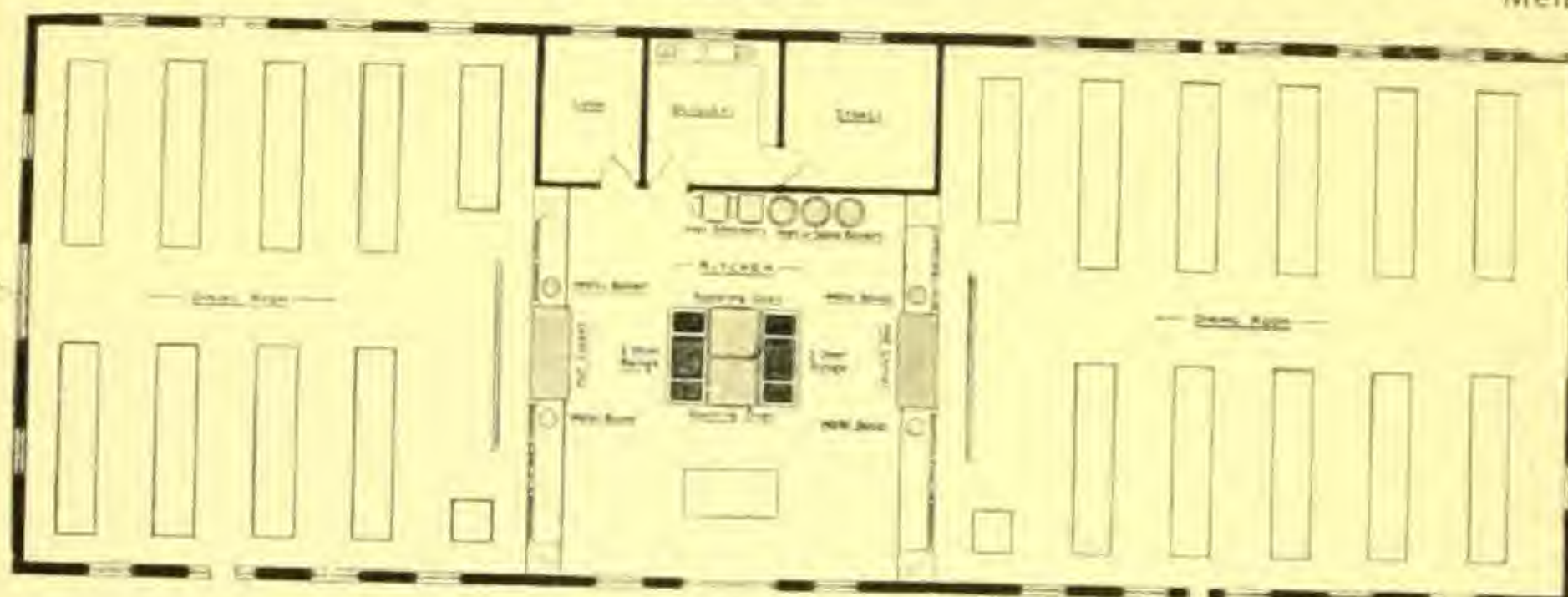
Our service to Architects includes assistance and co-operation in planning the layout of any large kitchen proposition. On receipt of a tracing of space available and details as to the class of trade and number of persons to be catered for, we would be pleased to draw up specification of suitable equipment, submitting illustrations, quotations and plotting in a suggested layout which would provide for efficient and economical operation of kitchen.

We have had a long and varied experience in this work and are glad to be of assistance to Architects in any matters relating to the selection, planning and operation of commercial kitchens for cafes, clubs, restaurants, staff dining-rooms, hospitals, institutions, etc.

We will also quote for complete installation of gas service and supply to appliances, if required, making ample provision for adequate gas supply, etc.



A typically compact Gas Cooking Set at the Melbourne Library Cafe Kitchen.



A standard layout of Gas Kitchen and Staff Dining Room to provide for 500 employees.

## GAS REFRIGERATION

### "Electrolux"

"Electrolux" is the only refrigerator in the world to produce crisp, dry cold continuously by means of a tiny Gas Burner and without the aid of ice, motor or mechanical parts. It has made refrigeration simple, economical, and accessible to every housewife who has gas available. She can now run her home along the modern time-saving, money-saving lines with the additional comfort and luxury that an "Electrolux" brings.

### Simple Operation

The absence of mechanism makes the "Electrolux" trouble-proof. Nothing to get out of order or to need attention. Just a simple, silent system welded into a solid unit; the tiny gas flame and a trickle of water is all that is required. A safety device is fitted which cuts off the gas if the water fails.



### Gas Models Available

Storage Capacity	Shelf Area	Wide	Overall Sizes Deep	High
Model G—				
6 c.ft.	10½ s.ft.	3ft. 1½in.	2ft. 1½in.	2ft. 11½in.
"Standard"—				
4 c.ft.	6½ s.ft.	2ft. 0½in.	1ft. 11in.	3ft. 10in.

### Low Operating Costs

Model G—	
3 to 4½ c.ft. of gas per hour; 6½ gals. water.	
"Standard"—	
1½ to 3 c.ft. of gas per hour; 5 gals. water.	

### Installation

The installation of "Electrolux" Gas Refrigerators is carried out by Electrolux Pty. Ltd., the cost varying according to work involved.

"Electrolux" Gas Refrigerators may be inspected in operation at our Showrooms



## THERE IS A GAS WATER HEATER FOR EVERY HOT WATER REQUIREMENT

Gas Water Heaters comprise Automatic Storage Heaters, Automatic Coil Heaters, Geysers, Circulating Boilers, Cafe Fountains, Sink Heaters, etc.

## The "Briar" Automatic Water Heater

is a compact, self-contained unit, well insulated, self-acting, available in sizes from 1 to 50 gallons to suit every purpose. The cost for gas is approximately 3.9 c.ft. per gallon of boiling water drawn off.

## Construction

Super heater and storage tank of hard-rolled copper, all joints well made, outer casing of galv. iron well lagged with powdered cork. Bray's flat-flame burners used for heating (no fumes), controlled by a well-constructed and easily-adjusted thermostat.

## Operation

The heat of gas burners is applied to the inside surface of lower or "heating" tank and underside of upper or "storage" tank. Hot water is stored in upper tank ready for use. Cold water enters lower tank and is heated, heating upper tank by circulation. The thermostat element extends into upper tank and turns gas to main burner on and off, according to temperature of water. A pilot light burns continuously and serves to maintain temperature of water and ignites burner when necessary.

## Recommended Sizes

For Domestic Kitchen Sink—1 gallon size.  
For Cafe and Restaurant Sinks—3 to 15 gallons.  
For Small Hot Water Service (4 points)—7½ to 10 gallons.  
For Larger Hot Water Service (6 to 8 points)—10 to 20 gallons.

## Method of Installation

The 1-gallon "Briar" is usually fixed by securing the supporting brackets to the wall over or adjacent to sink or basin. Usually to supply one outlet only, it is connected direct to water service. When supplying more than one hot water point, it is necessary to provide low-pressure water feed by means of a ball-cock cistern fixed above heater, as the "Briar" is not constructed to stand water pressure. Tank should be six to ten feet above heater. Larger sizes are designed to stand on a shelf or bracket, gas connected to burner, and an expansion pipe taken from top of heater up over cistern. Hot water supply is taken from a tee in expansion pipe and carried, with branches, to various points as required. When it is necessary to fix feed tank more than 10 feet above heater, a "heavy-duty" model must be used.

## BRIEF SPECIFICATION FOR FIXING "RAPID" GAS BATH HEATER

Heater should be fixed perfectly upright on cast-iron bracket or stand at foot end of bath, with outlet projecting to ensure water flowing into bath. Gas and water control taps to be on side nearest the user. Bracket should be screwed to a bevelled board securely fixed to wall; if brick, by means of wall plugs.

**GAS SUPPLY** must be of ample size to serve heater in addition to other appliances. A ¾-in. iron or ¾-in. compo. branch should be run from near meter outlet to heater, or from any ¾-in. or larger supply available. A control gas tap should be fixed close to heater to facilitate disconnection of heater for cleaning without interfering with other appliances.

**WATER SUPPLY** should be ¾-in. to stop cock and ½-in. N.P. brass from cock to heater. All water pipe, fittings and cocks must be tested.

Send for Copy of Complete Standard Specifications for Fixing "Rapid" Bath Heaters.

TABLE OF DIMENSIONS OF GAS CONSUMPTION OF "BRIAR" GAS WATER HEATERS.

Size in Gals. Cap.	Heating to 212° Fah.		Output per 24 hours	Height inches	Diameter inches	Gas Conn. inches	Water Conn. inches	Water Outlet inches
	minutes	c.ft. Gas						
No. 1	25	6	57	27	11	¾ B	¾ B	¾ B
No. 3	25	13	171	37	15½	¾ B	¾ B	¾ B
No. 5	30	19	240	49	17	¾ B	¾ B	¾ B
No. 7½	35	33½	307	48	17	¾ B	¾ B	¾ B
No. 10	40	41	360	43	19	¾ B	¾ B	¾ B
No. 15	40	53	540	48	19	¾ B	¾ B	¾ B
No. 20	45	74	640	57	23	¾ B	¾ B	¾ B

Also made in 30 gals., 40 gals., and 50 gals. capacity. Particulars on request.

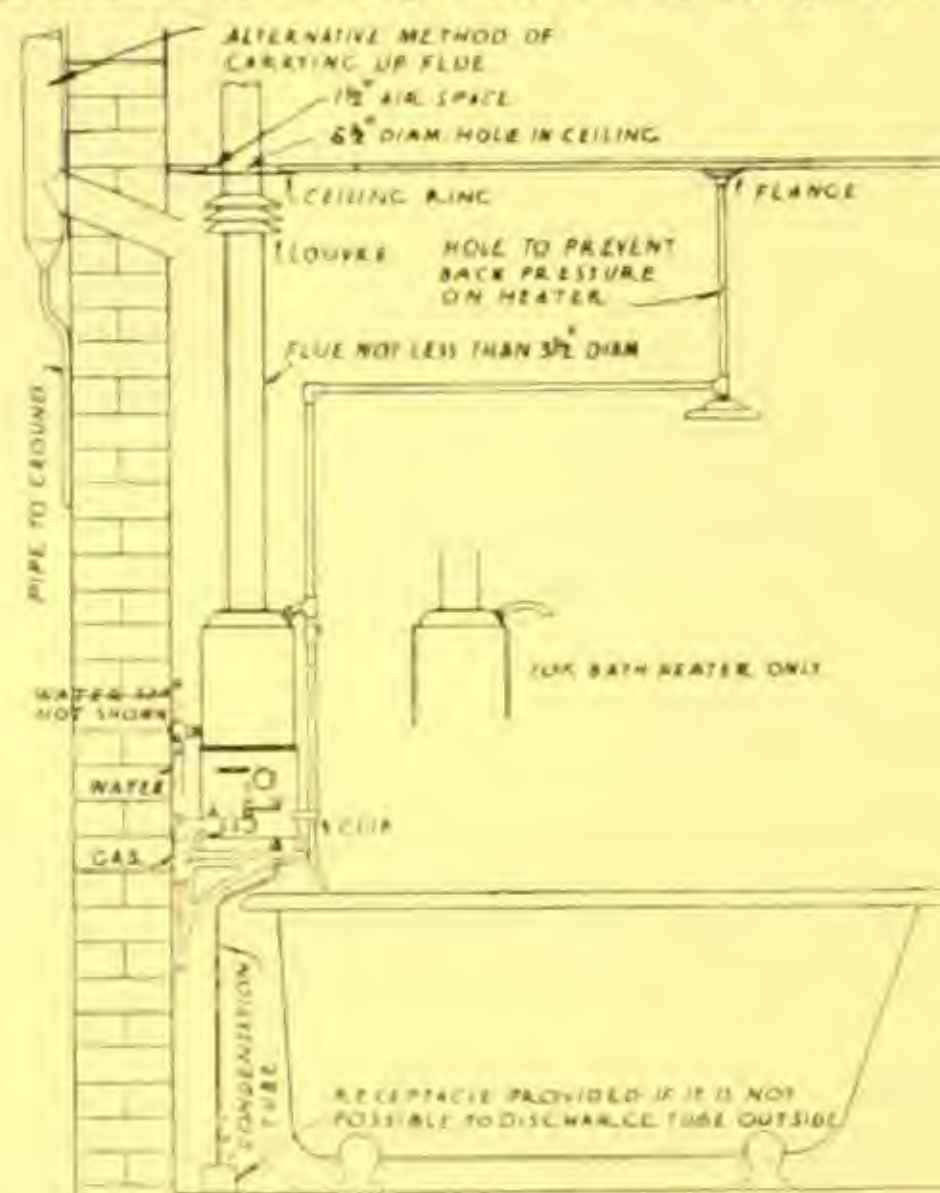
## "Rapid" Gas Bath Heaters

The "Rapid" is the most efficient (by test) and best value Gas Bath Heater on the market. Strongly constructed of copper, tinned waterways, nickelled exterior, non-contact type. Heated by six high-power burners and lighted by a swing-in-pilot. Easily adapted for Hot Shower.

## Sizes and Capacities

No. 1 "Rapid," 22 in. high, 9 in. dia. Delivers approx. 1½ galls. heated 50 deg. Fah. above temp. of cold water.

No. 2 "Rapid," 23½ in. high, 12½ in. dia. Delivers approx. 2½ galls. heated to 50 deg. Fah. above temp. of cold water.



**CONDENSATION** should be conveyed in brass or compo. pipe from outlet through floor or outside wall. If this is not practicable, condensation should discharge into receptacle provided in bathroom for that purpose.

**FLUES.**—Method of flueing depends on position, etc. No. 1 Heater requires 3½-in. diameter flue and fittings; No. 2 size, 4½-in. diameter. Illustration shows two methods and, where practicable, flue should be carried up at least 2 ft. above roof and fitted with effective draught-proof cow. A "louvre" should be inserted 3 in. below ceiling to assist ventilation, prevent down draughts, and facilitate disconnecting for cleaning. Air space of 1½ in. to be provided between flue and woodwork, the large hole in ceiling being covered by metal ceiling plate. All flue joints should be soldered and piping painted with aluminium (inside) and two coats oil paint (outside).

**ROOFS** pierced for flues should be well flashed.

(Continued on next page)



**Gas Heated Steam Radiation**

Gas-Heated Steam Radiators have been used in England for many years, heating all classes of buildings, and have proved their economy, full control of generous heat, and entire freedom from the need for attention after once being fitted. They are built for service, and may be relied on to give a long life of usefulness under all conditions, with a minimum of expense and attention.

"Gas-Steam" Radiation is the ideal system of heating for Churches, Halls, Cinemas, Showrooms, Factories, Storerooms, etc.

**Description**

"Gas-Steam" Radiators are complete systems using gas for fuel and delivering steam heat. No central-heating plant or steam piping is necessary. Each radiator is a complete steam plant within itself and operates independently from all other radiators. Each radiator burns its own fuel and generates its own steam heat. Thus, only those radiators need be operated in the rooms where heat is required.

**Construction**

"Gas-Steam" Radiators are made of cast iron; in appearance they are much like ordinary radiators. The sections are so designed that the upper part forms a steam radiating surface; directly beneath the radiating surface (see section) is a water chamber. The water should be checked once every year, and this, together with regulation of burner, is done free of charge. Water is supplied through a filling-cup at the end of the radiator. The gas burner is under the water chamber and is completely enclosed. Each radiator is equipped with an automatic control valve; water-filling plug, draining cock and air vent. All loops and other parts are metal, making a permanent and practically indestructible appliance.



Section showing gas burner, water level, filling plug, draining cock, and automatic control valve.

**Automatic Control**

When heat is required the gas is lighted. Steam is raised in a very few minutes. The automatic control valve, acted upon by the steam pressure, regulates the size of the gas flame and so automatically controls the gas consumption, thus preventing waste.

**Installation**

Easily installed in any desired position, each radiator is self-contained, needing only a gas supply connection ( $\frac{1}{2}$  in.) and flue outlet.

**Table of Heating Capacities**

	Per Radiator			
	Per loop	4 loop	6 loop	8 loop
Workshops and Factories	c.f. 700	c.f. 2800	c.f. 4200	c.f. 5600
Churches, Public Halls, Sale Shops, etc.	610	2440	3660	4880
Schools, Entrance Halls, Stairways, etc.	540	2160	3240	4320
Offices, etc.	505	2020	3030	4040

# "GAS-STEAM"

## Gas-heated Steam RADIATORS

**Dimensions and Prices**

No. of Tubes	Width Overall	Height	Price Art. Black
4	13½ ins.	39 ins.	£10 10 0
6	18½ ins.	39 ins.	£14 10 0
8	23½ ins.	39 ins.	£17 10 0

Bronze Finish—2/6 per tube extra.

**Estimating Size Required**

In estimating for the heating of churches and similar lofty buildings, it will be found sufficient if 15 feet only of the height is taken into account. Where there is a gallery, this should be taken as a separate apartment.

The figures given in the above tables are based upon average conditions. In certain cases, such as shown below, there may be special conditions which require additional Radiator Loops.

**Allowances for Special Conditions**

Add 10 per cent. to the total number of loops required for the following special conditions:—

1. Rooms or shops exposed to the South or West.

2. Rooms or shops having more than one outside wall, for each outside wall in excess of one.

Note.—This applies to rooms or offices in buildings made up of apartments, but does not apply to large open interiors, such as Churches, Halls, Factories, etc.

3. Rooms or shops having an unusual area of glass (windows, etc.); add the equivalent of two extra Radiator Tubes for each 80 square feet of glass more than the normal, the normal average being 20 square feet of glass per 1,000 c.f. capacity.

4. Corrugated iron walls, if well lined with match-boarding, or similar material.

5. Corrugated iron roof, if well lined.

6. When the ceiling of the room or shop is the roof, well boarded and plastered.

7. When the ceiling is a visible roof, not wood lined, but with felt beneath the plates or tiles.

Add 20 per cent. to the total number of tubes required.

**Representative Installations**

Melbourne University (Several Departments).

Vaughan House, Melbourne.

Queen's Hall, Collins Street, Melbourne.

Ball and Welch's Workrooms.

Buckley and Nunn's Workrooms.

Gas-heated Steam Radiators have the approval of the Department of Public Health, Melbourne.



The "Cosie" Gas Fire—"K" Fender. A popular type for "well" grates.

**RADIANT GAS FIRES** flood the room with flowing radiant heat in one minute—they heat like the sun and ventilate as they warm. Scientifically constructed and hygienically perfect, there are many handsome designs to harmonise with every type of interior decoration.

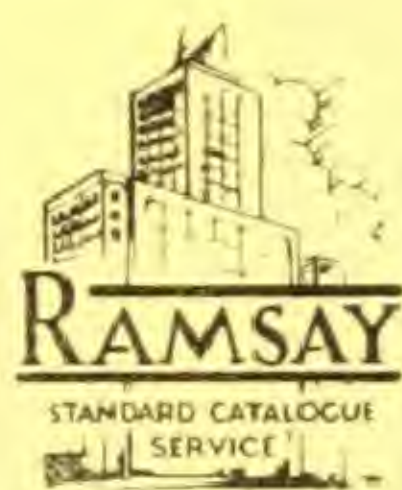
Send for our new illustrated Catalogue.



## SECTION M

[Containing S.A.A. Filing Section No. 30]

### HEATING AND VENTILATING





## WM. BEDFORD LTD.

476-490 LONSDALE STREET, MELBOURNE

SHEFFIELD HOUSE, PITT STREET, SYDNEY

Agents For

THE BEESTON BOILER CO. LTD.

NOTTINGHAM, ENGLAND

30c

S.A.A. File No.

BEESTON  
BOILERS  
RADIATORS

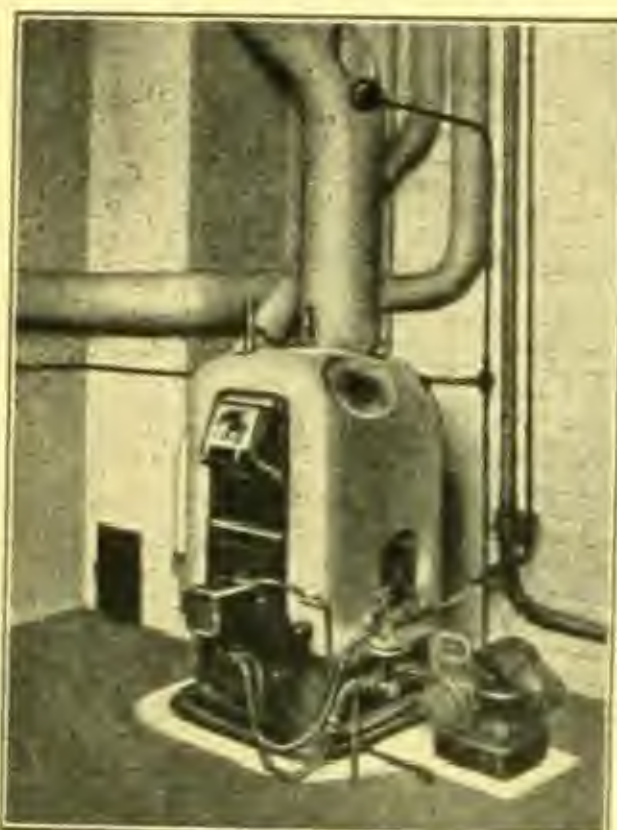
[For Other Products, See Pages 137, 164, 246, 415]

## Products

Robin Hood Boilers; Domestic Boilers; Beeston Boilers; Royal Boilers; Boiler Accessories; Princess, Royal, Beeston, and Hospital Radiators and Accessories; Valves; Pipes; Baffles; Grates; Towel Rails, etc., etc.

## Selection of Boilers

This is a most important matter. Any given duty can be performed by boilers of widely different sizes. Generally speaking, the larger the boiler adopted for a certain duty, within limits, the lower is the fuel consumption. When a relatively small boiler is adopted for a relatively high duty, the fuel consumption is extravagant because the heating surface of the boiler is not big enough to absorb all the heat generated, and an unduly large proportion of the heat escapes to the chimney. The consequent high temperature in the chimney maintains a fierce draught in the furnace, producing clinker on the firebars and rapid deterioration of same.



Beeston Domestic Boiler  
with Oil Burner.

## Boilers for Fuel Oil

The advent of oil as boiler fuel has given added popularity to Beeston Boilers, as every size and type of Beeston Boiler is constructed so that it may be fitted with an oil burner, or it will burn solid fuel, enabling the owner at any time to change from one to the other without the bother of alterations to the boiler. The particularly large and deep fire pot, roomy flues, and long flame travel, which characterise the Beeston products, give the utmost efficiency in fuel oil burning. The maximum amount

of oil which can be efficiently burnt in the combustion chamber of a heating boiler is 3 lbs. per hour per cubic foot of combustion space.

## ROBIN HOOD SECTIONAL BOILERS

Robin Hood Sectional Boilers are built up from three to twelve sections, and jointed with heavy screwed malleable nipples, having outlet for smoke pipe and flow and return tappings at back. An awkward method of boiler construction so often encountered is the use of one long bolt throughout the length of the boiler, making the lugs liable to break off as the result of the great expansion and contraction of the boiler metal. Overcoming this hazard, Beeston Sectional Boilers are connected section to section by a series of nuts and bolts, enabling one section to be lifted out of its position with the minimum of trouble.

Boilers should be mounted on perfectly air-tight brickwork to increase the depth of the ash pit and lengthen the life of the firebars. The thickness of the boiler metal varies with the model, so that weights of the various types differ accordingly. We do not recommend boilers to be worked to their full capacity; a size larger than actually required should

always be provided. Types available are: "Major," "New Senior," "C Pattern," "F Pattern," "General," and "Junior," as shown in the illustration, and particulars of these, together with details of dimensions and capacities, are given in the "Beeston Boiler" Catalogue, which will be given with pleasure to any applicant.



Group of Robin Hood Sectional Boilers.

## DOMESTIC BOILERS

Beeston Boilers are perfect for domestic use, having a neat appearance and being easy to keep clean, both internally and externally. A splendid feature of these boilers, and one that should be particularly noted, is that they have a Waterway Top, which means that the water in that section receives an intense amount of heat by comparison with the water in boilers which have no waterway actually above the fire, and thereby supplements the efficiency of the boilers. All boilers also have part Waterway Front, which forms considerable protection for the cast-iron front, and is also most valuable heating surface. There is no waterway tube over the clinker door, and consequently no trouble from sediment and deposit at this point, where also a protection fire-brick is fitted inside.



Group of Beeston Domestic Boilers.

Beeston Domestic Boilers are manufactured in "open fire" and "closed" type, as well as with special apparatus for heating out-houses, such as garages, green-houses, etc. Boilers for hot water supply are Bower Barfed, which is a chemical process carried out on the lining of the boiler to prevent corrosion and discolouration of the water. The smoke outlet is at the top of all Beeston Boilers, and is a socket to take spigot end of a smoke pipe. Damper is slide pattern. Inside depth of smoke socket—1½ in. A distance piece is fitted to all smoke outlets, which raises the damper 1½ in. above top of boiler and facilitates the working of damper slide, especially when the boiler is covered with composition. To obtain the best results, boilers, flow and return pipes, and cylinders should be covered with a good non-conducting material. Automatic damper regulators can be fitted to Domestic Boilers, and removable ash pans can be supplied. In districts where the water is highly impregnated with lime, the boiler should be cleaned two or three times a year.

It is claimed by their manufacturers that some boilers will produce 11,000 B.T.U.'s per square foot of heating surface. Although the Beeston closed type, through the employment of the open waterway, is the most efficient heating unit manufactured, the Beeston Boiler Co. Ltd., insist that their boilers shall be rated at 10,000 B.T.U.'s only. The advantages of this reserve heating power of the Beeston Boilers are obvious.



The capacities are shown in the following table:—

TABLE OF CAPACITIES—BEESTON DOMESTIC BOILERS

Size.	Outside Measurements over all.			Dia. of Smoke Pipe.	Sq. ft. of Heating Surface.	B.T.U. per Hour for Hot Water Supply.*	Capacity—Gallons per Hour.		
	Height, Inches.	Width, Inches.	Depth, Inches.				60 deg. to 100 deg.	60 deg. to 130 deg.	60 deg. to 212 deg.
OX	28½ x 16½ x 15½	4½	4½	4½	44	43,000	108	62	28
AX	31 x 18½ x 17½	4½	5½	4½	54	53,200	133	76	35
CX	31½ x 18 x 20½	5	7½	5	74	76,000	189	108	50
DX	36½ x 21½ x 21½	5	9½	5	94	91,200	227	130	60
EX	39½ x 24½ x 25	5	12½	5	124	125,000	312	179	82

\*Based on 10,000 B.T.U. per sq. heating surface.

## INSTALLATION DATA

Pipe sizes should be carefully considered, as the efficiency of the apparatus largely depends on the design and fixing of the pipes. The boiler stand must be fixed on a level brick or concrete foundation, and, if possible, raised one course of bricks to add depth to the ash pit. The chimney must be carried higher than the surrounding buildings and contain a separate flue for each fire. Connecting pipes to the boiler, both flows and returns, should not be built into the wall close to the boiler, but allowed free room for expanding. Do not fix the cold water supply direct to the boiler, but in the return at least ten feet away. We recommend all sectional boilers to be fitted with an open-air pipe direct from the boiler; "Majors" and "Seniors," 2 in. diameter; "C" and "F" Patterns, 1½ in. diameter; other boilers, 1¼ in. diameter.

## RADIATORS

## Types Available

- Royal Radiators, specially built for domestic installation.
- Royal Radiators for offices, banks, factories, warehouses, theatres, etc.
- Royal Window Radiators for placing under seats and windows.
- Royal Curved Radiators.
- Beeston Hospital or School Radiators: Passage and Domestic Radiators.
- Beeston Wall Radiators.
- Princess Window Radiators.
- Princess Radiators.

## Features

It has been proven by independent tests that the Beeston Radiator has a higher heat transmission than any other type, and the British characteristics of long life and service are particularly noticeable in these products. The group of Royal type Radiators shown in this page gives an idea of their sturdy and pleasing appearance. There are sizes, styles and shapes of radiators stocked for all classes of buildings. All radiators are fitted for hot water unless specially ordered for steam. Radiators can be supplied without feet in all sizes, but unless otherwise specified, feet are provided. Ask us to send you a catalogue containing full details. A table of the heating surfaces in square feet per section of various types of Beeston Radiators is shown at the foot of this page.

## ROYAL RADIATORS

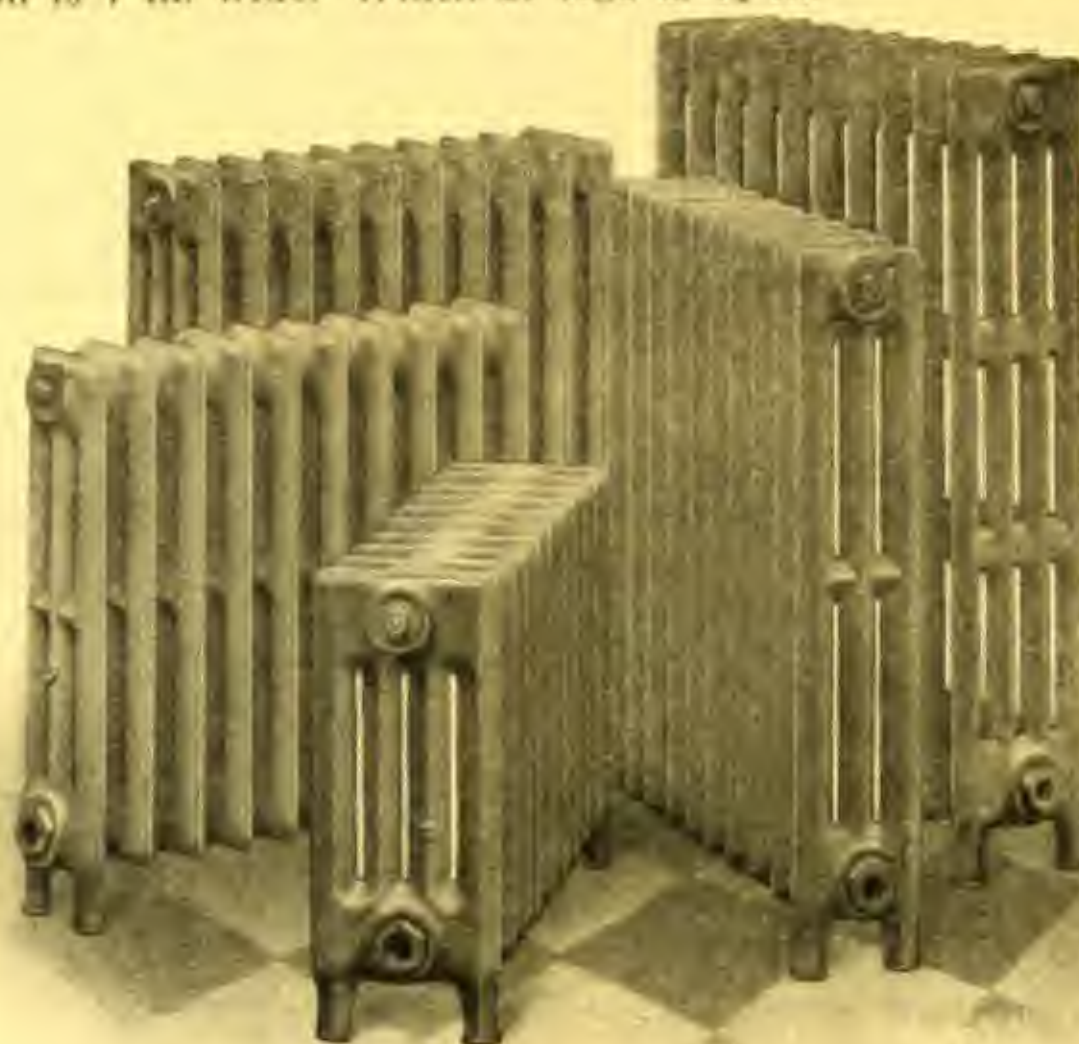
Unless otherwise specified, these radiators are tapped 1½ in. at top and 1½ in. at bottom, and bushed to 1 in. when they contain 50 feet, and to 1½ in. when they contain over 50 feet. Each section is connected with 1½ in. right and left hand screwed malleable nipples at bottom and 1½ in. at top. Radiators are tapped for ½ in. air cock. Radiators over 24 loops despatched in two pieces. Radiators of 20 loops and over supplied with leg section.

## CURVED RADIATORS

Made in Royal, Princess and Hospital patterns, in standard widths and heights up to three feet. Radiators are not made to a less curve than two feet radius. When ordering, give radius of curve and skirting. Unless otherwise specified, radiator is designed to be placed 1½ in. from skirting.

## HOSPITAL RADIATORS

Specially designed for use in hospitals and schools, this radiator is 1½ in. wide at narrowest point between the loops, which enables every part to be cleaned easily, and allows greater air connection between columns. It has no beads or projections of any description, except the bosses for connecting to pipes, and therefore is absolutely hygienic and has no receptacles for dust. Radiators are also made hinged. Water capacity, .15 gallons per square foot heating surface. Each section is 7 in. wide. Width of legs is 7½ in.



A Group of Royal Radiators.

## BAFFLE PLATES

Baffle Plates, which may be easily detached for cleaning purposes, are obtainable for fitting to radiators. Plates are hung on radiators with patent clip and bolt.

## BEESTON RADIATOR VALVE

Beeston Radiator Valves can be fitted to any pattern radiator, except wall type. They project 2 3/16 in. from radiator when closed, and are easy to work without stooping. They increase the efficiency of the radiator and are quick in action—two turns close the valve.

## PROMINENT INSTALLATIONS

Central heating by Beeston products is a method which has been proved far superior to heating by such means as electricity, plenum, gas and steam because of low maintenance cost, nominal fuel consumption, efficiency, and pleasing and natural warmth and long life. For these important reasons, Beeston products have been installed in the apartments of Their Majesties at Buckingham Palace; and their merits are recognised by leading engineers and architects, as shown by the following partial list of a few prominent installations recently carried out:—

Commercial Bank of Australasia Ltd., Melbourne. Architects: A. & K. Henderson.  
Bank of Australasia Ltd., Melbourne. Architects: A. & K. Henderson.  
National Bank of Australasia Ltd., Melbourne. Architects: A. & K. Henderson.  
Debenham's Buildings, Melbourne. Architects: A. & K. Henderson.  
Temperance & General Mutual Life Society, Sydney and Bendigo. Architects: A. & K. Henderson.  
Howey Court, Melbourne. Architect: H. A. Norris.  
Coles' Building, Melbourne. Architect: H. A. Norris.  
Kellow-Falkner Buildings, St. Kilda. Architect: H. A. Norris.  
Residence, G. Nicholas, Macedon. Architect: H. A. Norris.  
Ports and Harbour Building, Melbourne. Architects: Sydney Smith, Ogg and Serpell.  
Austin Hospital. Architects: Stephenson and Meldrum.  
State Theatre, Melbourne. Architects: Bohringer, Taylor & Johnson.  
State Theatre, Sydney. Architect: H. White.  
Regent Theatre, Fitzroy. Architect: C. N. Hollinshed.  
Victory Theatre, St. Kilda. Architect: C. H. Ballantyne.  
And the majority of schools, hospitals, etc., erected by the Victorian and N.S.W. Public Works Departments in recent years.

TABLE OF HEATING SURFACES IN SQUARE FEET, PER SECTION OF VARIOUS BEESTON RADIATORS

ROYAL				PRINCESS			HOSPITAL		HOSPITAL	WALL TYPE	
3 Col.	4 Col.	5 Col.		1 Col.	2 Col.	5 Col.	7in. Wide.		5in. Wide.	inches.	sq. ft.
sq. ft.	sq. ft.	sq. ft.		sq. ft.	sq. ft.	sq. ft.	sq. ft.	sq. ft.	sq. ft.		
36	3	4 1/3	5 1/5	39	3 4/10	4½	36	3 3/5	2 3/5	22½	7½
30	2½	3½	4 3/10	36	3 1/10	4	30	3	2 1/5	14½	8
24	2	2½	3 2/5	30	2 6/10	3½	24	2½	1½		
18	1½	2	2½	24	2	2½	18	1½	1 2/5		
				18	1½	1 4/5					



30c

S.A.A. File No.

## HARTLEY &amp; SUGDEN LIMITED

Boilers and Heating Appliances

THE DOMESTIC ENGINEERS & PLUMBERS SUPPLIES CO.  
PTY. LTD.

383 LATROBE STREET, MELBOURNE, VICTORIA.

"WHITE  
ROSE"  
BOILERS

[For Other Products, See Page 437]

## Products

"White Rose" Semi-cast Steel Sectional and Multitubular Boilers; heating appliances for central heating by hot water or low-pressure steam, and for domestic hot-water supply.

## Domestic Boilers

(For Hot Water Supply)

"White Rose" Domestic Boilers are made of the highest grade cast iron, and are compact, strong and durable. Provision is made for access to all parts of waterways, and the boilers are specially treated to give clean, hot water at all temperatures. Domestic boilers are available in three sizes, with ratings and capacities as set out in the following table:—



"White Rose" Domestic Boiler.

No.	Sizes.		Heating Surface.	Grate Area.	B.T.U. per Hour for Hot Water Supply.	Gallons per Hour.	
	Total Height.	Diam.				100 F.	150 F.
CD 1	in. 32 1/2	in. 19	sq. ft. 4.6	sq. ft. 0.8	50,000	100	50
CD 2	in. 40 1/2	in. 19	sq. ft. 6.4	sq. ft. 1.2	70,000	140	70
CD 3	in. 46 1/2	in. 22 1/2	sq. ft. 9.1	sq. ft. 2.0	100,000	200	100

## Sectional Cast Semi-Steel Boilers

(For Hot Water or Steam)

"White Rose" Semi-cast Steel Sectional Boilers are available in a large range of models and sizes, with B.T.U. capacities as set out in the following tables. These boilers are suitable for either coke or oil firing.

WHITE ROSE SERIES A1.

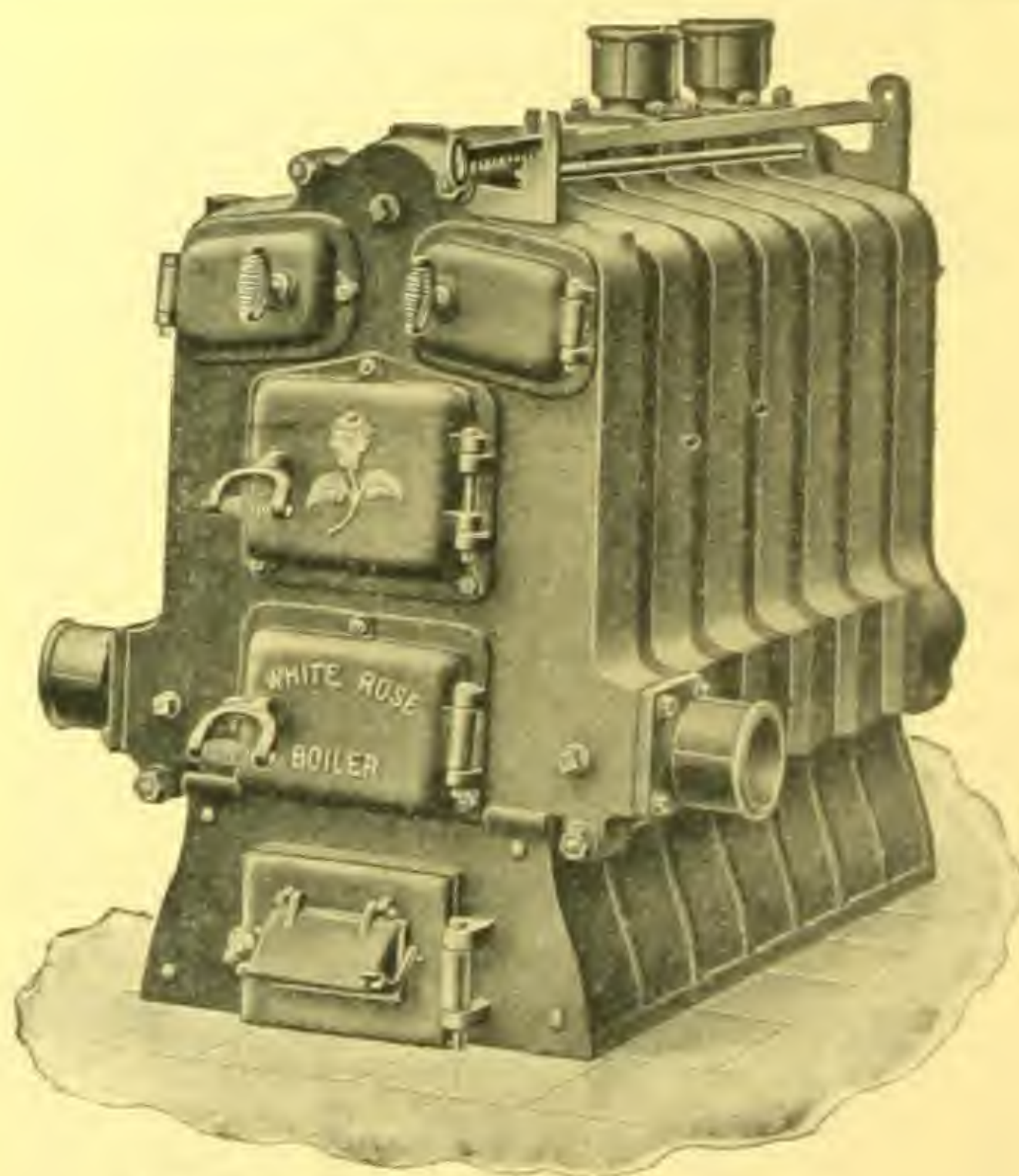
No.	Boiler Heating Surface.	Heating Power 4-in. Pipes.	Heating Power Direct Radiation.	B.T.U. Capacity Per Hour.	Length of Base.	Grate Area.	Fuel Capacity.	Smoke Nozzle Diameter.	Water Content.
606	sq. ft. 133	lin. ft. 3,475	sq. ft. 4,065	585,200	in. 49 1/2	sq. ft. 9.45	cu. ft. 19	in. 14	gals. 104
607	157	4,100	4,800	590,800	57 1/2	11.2	22	14	118.5
608	181	4,725	5,530	796,400	65 3/4	13.1	26	14	133
609	205	5,350	6,265	902,000	74	14.8	30	14	147.5
610	229	5,975	7,000	1,007,600	82 1/2	16.7	34	16	162
611	253	6,600	7,730	1,113,200	90 3/4	18.5	38	16	176.5
612	277	7,225	8,465	1,218,800	99 1/4	20.3	42	16	191
613	301	7,850	9,200	1,324,400	107 3/4	22.1	46	16	205.5

WHITE ROSE SERIES B2.

No.	Boiler Heating Surface.	Heating Power 4-in. Pipes.	Heating Power Direct Radiation.	B.T.U. Capacity Per Hour.	Length of Base.	Grate Area.	Fuel Capacity.	Smoke Nozzle Diameter.	Water Content.
505	sq. ft. 76	lin. ft. 1,985	sq. ft. 2,320	334,400	in. 36 1/2	sq. ft. 5.0	cu. ft. 9.0	in. 10	gals. 47.5
506	92	2,400	2,810	404,800	43 1/2	6.3	11.25	10	55
507	108	2,820	3,300	475,200	50 1/2	7.55	13.5	12	62.5
508	124	3,240	3,785	545,600	57 1/2	8.8	15.75	12	70
509	140	3,660	4,275	616,000	64 1/2	10.0	18.0	12	77.5
510	155	4,080	4,765	686,400	71 1/2	11.3	20.25	12	85
511	172	4,500	5,255	756,800	78 1/2	12.5	22.5	12	92.5
512	188	4,920	5,745	827,200	86 1/2	13.8	24.75	12	100

WHITE ROSE COUNTY SERIES No. 3.

No.	Boiler Heating Surface.	Heating Power 4-in. Pipes.	Heating Power Direct Radiation.	B.T.U. Capacity Per Hour.	Length of Base.	Grate Area.	Fuel Capacity.	Smoke Nozzle Diameter.	Water Content.
34	sq. ft. 35.85	lin. ft. 935	sq. ft. 1,095	157,740	in. 30 1/2	sq. ft. 3.4	cu. ft. 4.25	in. 8	gals. 20
35	45.6	1,192	1,395	200,540	38	4.5	5.5	8	24
36	55.35	1,450	1,695	243,540	45 1/2	5.6	6.75	8	28
37	65.1	1,700	1,995	286,440	52 1/2	6.7	8.0	9	32
38	74.85	1,960	2,295	329,340	59 1/2	7.8	9.25	9	36
39	84.6	2,215	2,595	372,240	66 1/2	8.9	10.5	9	40



"White Rose" Cast Semi-Steel Sectional Boiler.



WHITE ROSE COUNTY SERIES No. 2.

No.	Boiler Heating Surface.	Heating Power 4-in. Pipes.	Heating Power Direct Radiation.	B.T.U. Capacity Per Hour.	Length of Base.	Grate Area.	Fuel Capacity.	Smoke Nozzle Diameter.	Water Content.
	sq. ft.	lin. ft.	sq. ft.		in.	sq. ft.	cu. ft.	in.	gals.
24	22	575	675	98,800	23 1/4	1.97	2.5	7	13.5
25	28	730	860	123,200	30 1/4	2.6	3.3	7	15.8
26	34	885	1,040	149,600	36 1/4	3.24	4.1	7	18.1
27	40	1,040	1,225	176,000	42 1/4	3.9	4.9	8	20.5
28	46	1,200	1,410	202,400	48 1/4	4.7	5.8	8	23
29	52	1,350	1,590	228,800	54 1/4	5.17	6.7	8	25.3

WHITE ROSE COUNTY SERIES No. 1.

No.	Boiler Heating Surface.	Heating Power 4-in. Pipes.	Heating Power Direct Radiation.	B.T.U. Capacity Per Hour.	Length of Base.	Grate Area.	Fuel Capacity.	Smoke Nozzle Diameter.	Water Content.
	sq. ft.	lin. ft.	sq. ft.		in.	sq. ft.	cu. ft.	in.	gals.
13	10	261	310	44,000	11	0.62	1.0	5	6.2
14	13	342	400	57,200	15 1/2	0.96	1.6	5	7.5
15	16	423	490	70,400	20	1.29	2.2	5	8.8
16	19	504	580	83,600	24 1/4	1.63	2.8	5	10.1
17	22	575	675	96,800	29 1/4	1.97	3.4	5	11.4

## DOMESTIC HOT WATER SUPPLY

In order to decide the quantity of water to be stored, and to calculate the amount required for any domestic service installation, the following table will be useful as an indication of average requirements for different types of buildings. The figures are gallons of water drawn off per hour at a temperature of 150 deg. Fahr. for each tap detailed.

Type of Building.	Residences.	Flats.	Hotels.	Hospitals.	Schools.	Offices.
Baths . . . . .	20	40	40	40	—	—
Sinks . . . . .	10	10	20	20	10	—
Lavatory Basins (Private)	3	3	3	3	3	3
Lavatory Basins (Public)	—	—	10	—	15	10
Showers . . . . .	10	10	40	20	40	—

The hot water storage cylinder or tank should contain at least one hour's supply and the boiler capacity should correspond to this duty on a normal boiler rating of 7,000 B.T.U.'s per square foot boiler surface. This is the rating for normal firing of all "White Rose" hot water boilers.

It is advisable for all building, detailed in the table above, with the exception of residences, to base the boiler capacity on normal firing ratings, because in buildings such as hotels, etc., there are often rush periods when there is an exceptionally heavy demand, and therefore the boiler can be stoked harder in order to meet the excessive demand when this prevails. For example, a hotel with three bathrooms, one sink, six lavatory basins, should be detailed as follows:—

Baths, 3 x 40 = 120 gallons.  
Sink, 1 x 20 = 20 gallons.  
Lavatory basins, 6 x 3 = 18 gallons.  
Allow for total requirements 158 gallons per hour at 150 deg. F.  
158 x 1,000 = 158,000 B.T.U. per hour

7,000 boiler rating = 22.57 sq. ft. boiler

heating surface to supply the requirements with easy firing. For this installation, No. 17 of the County Series No. 1 should be selected.

## CENTRAL HEATING

The general method of heating in Australia is by hot water, and in some cases low pressure steam, and for the climate and other conditions here, the hot water method is possibly the most suitable. The various temperatures of rooms, etc., are very hard to define, as no two persons can agree on the same temperature, but the following tables are deemed to be correct for the average person, and will prove helpful in the designing of a heating system.

## HOT WATER

Area of radiation surface to afford various temperatures.

Temperature required when outer air is 30 deg. F.	Sq. ft. of rad. allowed each 1,000 cubic ft. of space.	Rooms and places in which the heat is required.
55 deg. Fahr.	12	Garages, workshops, stores, etc.
57 deg. Fahr.	13	Places of worship, halls, etc. (when empty)
60 deg. Fahr.	15	Offices, banks, schools, living rooms.
62 deg. Fahr.	16	Living rooms.
65 deg. Fahr.	18	Bathrooms, and to get 58 deg. in entrance halls.
68 deg. Fahr.	20	
80 deg. Fahr.	38	
90 deg. Fahr.	68	
100 deg. Fahr.	118	Drying rooms.
110 deg. Fahr.	200	
120 deg. Fahr.	300	

## Description of the "HEINTZ" Original and Only Genuine Steam Trap Expansion Type

This is not a metal-expansion trap depending on the slow action under varying temperatures of a solid rod or bar of metal, but works by the expansion and contraction of a curved hollow tube-spring hermetically sealed, containing a highly volatile liquid which renders it extremely sensitive.

At starting, the valve is wide open.

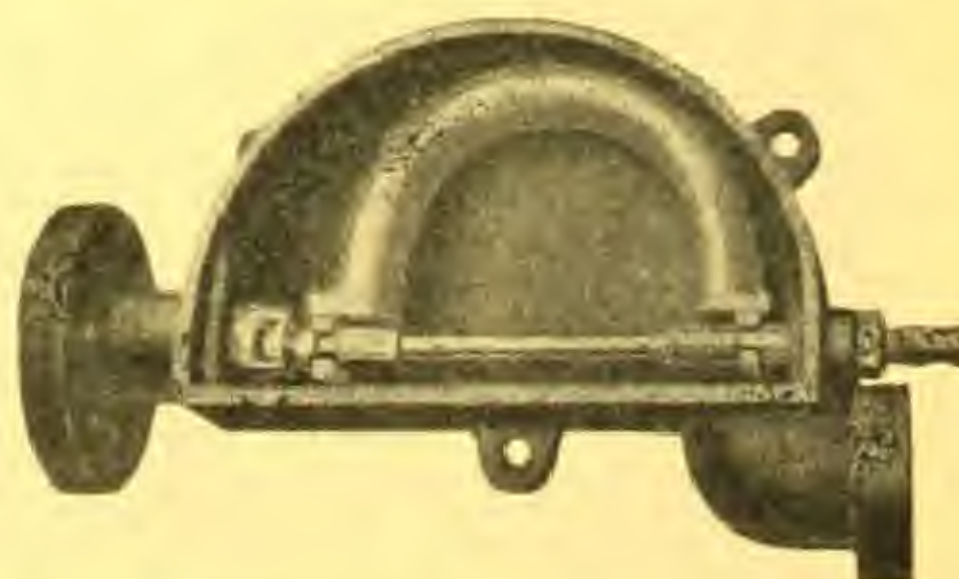
"Heintz" Traps are always used where a pressure in a piece of equipment is to be maintained.

## "HEINTZ" LOW-PRESSURE TRAPS

For pressures up to 100 lbs. per square inch, complete with loose flanges, bolts and joints.

Size No.	Diam. of Pipe Connections. Inches.	Diam. of Valves. Inches.	Capacity in feet of 1-inch Pipe according to Radiating Conditions.	Gallons of Condensation per minute.
00			200 to 500	1
0			250 to 1,000	2
1			500 to 3,000	5
2			1,000 to 5,000	8
3			1,500 to 6,000	15
4	1	1	2,500 to 10,000	30
5	1 1/2	1 1/2	4,500 to 16,000	60

Each size of "Heintz" Traps will give better results than the next larger size of any imitation make.



(Continued on next page)



## MUELLERS' REDUCING, RELIEF VALVES AND STRAINERS

## General

The Domestic Engineers' and Plumbers' Supplies Co. Pty. Ltd. carry a complete range of Muellers' Reducing valves, Relief valves, strainers and automatic damper regulators, suitable for fitting to any make of boiler. Co-operation and advice on any heating problem will be gladly given.

## Reducing and Regulating Valves

Muellers' Reducing and Regulating valves for water, steam and oil are suitable for initial pressures not greater than 225 lbs. and for any desired delivery pressures from 5 to 125 lbs., according to the springs and diaphragms assembled in the valves. Valves for delivery pressures in excess of those stated, within the capacity of the valve, will be furnished to specification.

The valves are durable and dependable, being positive in action, opening and working freely after long periods of inactivity. The working parts are of bronze with phosphor bronze diaphragms. These valves are furnished in  $\frac{1}{2}$  in. to 12 in. sizes. These valves are a necessary part of such equipment as steam cookers, heating systems, unit heaters, hospital sterilizers, etc.



Muellers' Reducing Valve.

## Relief Valves

Muellers' diaphragm-operated relief valves are the most dependable on the market. They are very sensitive and

respond quickly the instant the pressure rises to the point at which the relief valves have been set. The valves will operate after long periods of inactivity because the full pressure is at all times exerted against the full area of the diaphragm, which in the  $\frac{1}{2}$  in. size is  $81\frac{1}{2}$  times greater than the area of the seat openings. Valves for pressures up to 150 lbs. have bronze bodies and iron diaphragm and spring chambers; for pressures above 150 lbs., the bodies and diaphragm chambers are bronze. Composition seat discs will be furnished suitable for the required service. Relief valves are available in  $\frac{1}{2}$  in. and  $\frac{3}{4}$  in. sizes.



Muellers' Relief Valve.

## Strainers

Muellers' strainers placed ahead of water meters, regulators, etc., intercept all foreign substances in water, and thereby prolong the life of the various fixtures. It is recommended that a Mueller strainer be installed in connection with all Mueller reducing and regulating valves. As the water enters the strainer it strikes a baffle plate before passing through the screen, and the sediment is deflected to the lower chamber, where it settles to the bottom, from where it can easily be removed. Strainers are furnished in all sizes from  $\frac{1}{2}$  in. to 12 in.

## THE LACO OIL BURNER

## Features

The Laco is an automatic, electrically controlled oil burner, having the following exclusive features:—

**Its Own Pilot Light.**—No separate oil, gas or electric pilot light. When working automatically, and the house temperature reaches the desired maximum, the oil flow is decreased and the flame gradually drops to a mere glimmer and remains there—its own pilot light. When temperature drops two degrees, the thermostatic control automatically increases oil flow and flame gradually grows again to maximum or heating efficiency. This eliminates strain and breakage of castings as in other types of burners where flames snap on and off.

**Pilot Cannot Snuff Out.**—The Laco's own pilot light operating on its own fuel cannot be snuffed out on either high or low flame.

**Keeps Heating if Current Dies.**—The Laco will heat fifty per cent. efficient for at least twenty-four hours with electric current entirely off.

**Will Not Bother Radios.**—The motor is of the induction, impulsion type, and guaranteed not to interfere with radios.

**Quiet.**—Practically noiseless. The only sound is that of the flames—the sound of perfect combustion.

**Wick Type.**—Which successfully operates on a high-low principle. Flame never goes out. No ignition necessary. Extremely simple; quick and easy to light. Any child can light it with a match.

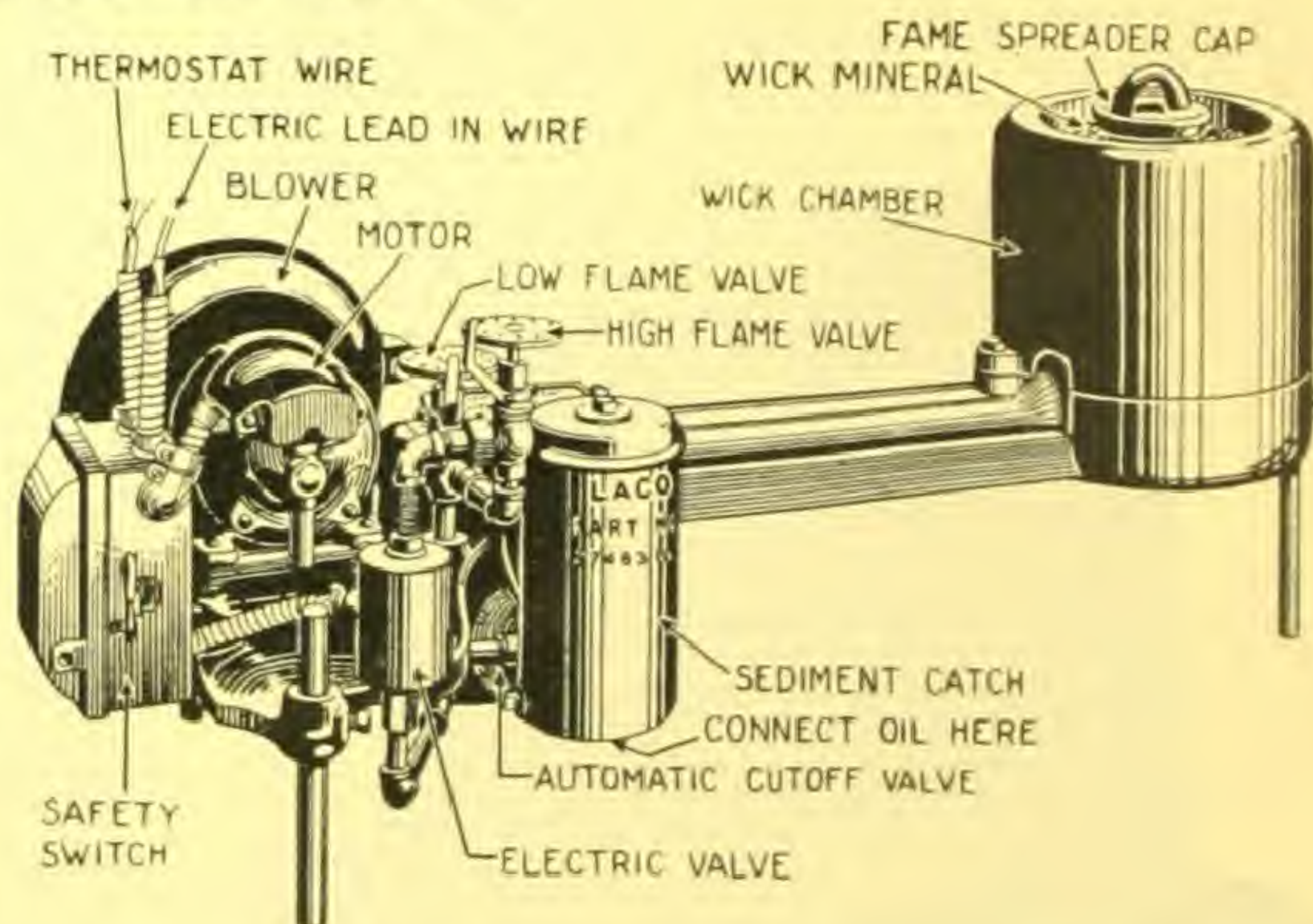
## Other LACO Advantages

**Electrical Control Valve.**—Self-cooled by oil flowing through coil. In case the current goes off when operating on high flame, this valve automatically switches to low flame and resumes to high again immediately when the current comes on.

**Extra Large Sediment Catch.**—This extra large sediment catch is built integrant with the burner directly before the oil enters the control valves.

**Float-type Trip.**—This built-in overflow has automatic safety-stop in oil line which cuts off flow of oil in case the oil is turned on when fire is not burning.

**Safe.**—The Laco works like a common wick oil stove. It is safer than a gas range. It is impossible for the liquid fuel to get loose in the firebox. Installations are made to comply with all city regulations.



**Economical to Operate.**—The Laco will burn any fuel, oil, gas oil, furnace oil, distillate, or kerosene, that has a gravity above 36 Baume, and which is light in colour and will flow at below zero temperature.

**Guarantee.**—The Laco Burner is designed to last a lifetime. However, following common practice in the oil-burner industry, we limit our guarantee to one year from date of sale. During this period any parts proving defective (if not caused by misuse or neglect) will be replaced by us.

## Natural Draft Oil Burners

The Domestic Engineers and Plumbers Supply Co. Pty. Ltd. have also available the Laco Natural Draft Oil Burners, which are suitable for any kind of use requiring a low-priced oil burner.



G  
&  
N

## GARDNER &amp; NAYLOR PTY. LTD.

## Domestic Engineers

Offices and Showrooms:

34 QUEEN STREET, MELBOURNE  
Tel. C. 3290

Works:

1 TERRY STREET, MELBOURNE  
Tel. F 3679-3670

29d

S.A.A. File No.

[For Other Products, See Page 476]

## WATER HEATERS AND BOILERS

Boilers and equipment manufactured by Gardner and Naylor Pty. Ltd. are based on many years of practical experience; the improvements which are built into them as they are proved, and their strong and faithful construction, placing them in the highest grade.

Materials used in the construction are specially chosen for strength and durability and suitability for the purpose required, each unit being tested before leaving the works and carrying the firm's guarantee.

## Briquettes, Coke and Wood

## "VICTOR" COMBINATION BOILER

The "Victor" boiler is constructed of heavy gauge, acid-resisting copper. The boiler base is of cast iron, incorporating rocking and tilting firebars; these assisting in brightening the fire when adding fuel and emptying the ashes from the combustion chambers into the removable ash pan. Raking, with its consequent dust, is in this way eliminated, so keeping the boiler surroundings clean and free from dust.

The boiler is heavily insulated with special material, and is cased in galvanized steel. The flue, which is provided with a cast-iron adjustable damper above the top of the boiler, is carried through the storage, this being combined with the boiler as a unit. This unique construction, besides giving greater heating area, and therefore greater heating efficiency and economy, reduces the cost of manufacture and installation.

Being a compact fitting with a neat appearance, the "Victor" boiler may be fitted in kitchen, laundry, verandah, etc., and is usually fitted on a 9in. brick base. Fuel may be briquettes, coke, wood and dry household refuse.

This boiler is approved by the State Electricity Commission for burning briquettes.

## DIMENSIONS

Capacity Gallons	Diameter Inches	Height Feet
40	21	5
50	22	5
60	23	5



"Victor" Combination Boiler.



"Boska" Boiler.

## The "Boska" Boiler

For systems which require a larger capacity than can be supplied by the "Victor" boiler, the "Boska" is built for capacities from 60 to 250 gallons, and is always used in conjunction with a storage cylinder or tank. This boiler burns coke, briquettes, wood of suitable size, or dry household refuse.

The interior cylindrical shell or coil of heavy gauge, acid-resisting copper is fitted on cast-iron fire-checks. The outer

casing is steel, the cast-iron top and base incorporates the standard removable ash pan and rocking and tilting firebars. A cast-iron firing door is provided to facilitate lighting, and an adjustable cast-iron damper is fitted on the flue connection for controlling the fire.

The "Boska" Boiler is approved by the State Electricity Commission for burning briquettes.

## DIMENSIONS

No.	Cylinder or Tank Capacity Gallons.	Diameter, (inches)	Height, (inches)
1	60	15	30
2	100	15	33
3	150	22	41
4	250	22	45

## Gas—

## "Invincible" Automatic Boiler

This is a thermostatically regulated combined boiler and hot water storage unit for gas operation, and is essentially a copper water jacket surrounding the combustion chamber of the boiler and a series of coils connecting across the centre in the path of the flue gases. The boiler is insulated with three thicknesses of hair felt and is cased neatly with galvanized sheet iron and finished in grey enamel, while the burner base and all mountings are nickel-plated.

The gas burners are of the luminous or flat-flame type, which have proved the most satisfactory for this type of boiler. The position of the burners and the size of the combustion chamber have been accurately proportioned, in order to obtain the complete combustion of the gas. The "Invincible" is quite automatic, as the gas supply is controlled by a thermostat, which keeps the water at just the temperature desired. The thermostat is adjustable to suit varied temperature requirements. A pilot flame burns the whole time that the gas is on, so that the boiler may be left on all day with perfect safety, and will literally take care of itself.

An anti-down draft cowl is supplied with the boiler if desired.

## DIMENSIONS

Capacity	Height	
2 gallon	24in.	15in. x 8in.
6 "	2ft. 6in.	16½in. diameter
10 "	3ft.	16½in. "
15 "	3ft. 8in.	16½in. "
20 "	4ft. 0½in.	16½in. "
25 "	4ft. 5in.	16½in. "



"Invincible" Automatic Gas Boiler.

(Continued on next page)

RAMSAY'S CATALOGUE



**"Invincible" Gas Circulator**

This is an Automatic Gas Boiler designed to heat separate hot water storage cylinders and tanks for hot water services, etc.

It is often used for assisting hot water systems by working supplementary to another heating unit. It always requires some form of separate hot water storage.

Dimensions—12 in. diameter by 2 ft. 2 in. high.

**Steam Calorifiers**

When a supply of steam is available, calorifiers are the most efficient means of heating water. They are entirely automatic in operation, a thermostat controlling the steam supply in accordance with the hot water demand.

**High Water Pressure Calorifiers.**—This type is for water pressures up to 120 lbs. per sq. in., and consists of a copper-lined mild steel shell. On the end plate a cast-iron steam chest is bolted, having steam and exhaust connections. Solid drawn copper V-tubes are expanded into the end-plate and covered by the steam chest.

**Low Water Pressure Calorifiers.**—For water pressures up to 40 lbs. per sq. in. the calorifier consists of a copper cylinder with a heating coil of heavy gauge copper tube.

**Indirect Hot Water Systems**

In hard water districts, it has been found that a lime deposit readily forms on the interior of the boiler, which reduces the efficiency tremendously, and in most cases ruins the boiler.

The difficulty is overcome by adopting the indirect system, in which the boiler is not openly connected to the hot water supply system and is thus protected from harmful deposits.

**Electric—"Garnay" Electric Water Heater**

This fitting, which conforms to the high standard of other Gardner & Naylor products, has a special claim owing to its high all-round efficiency, especially as regards the electric element and insulation.

The construction of the hot-water container, or cylinder, is of heavy-gauge copper, the electric element, which is the vital centre of the system, being designed to operate at low temperatures, guaranteeing efficient operation and long life. The circulation pipes are so connected that the hottest water is always drawn from the container.

Surrounding the hot-water storage container, electric element and circulating pipes, is a 3-in. thickness of special insulation, which has an important bearing on the high efficiency of the "Garnay" unit. Booster elements are fitted if required.

The "Garnay" unit, which can be arranged with thermostatic control, is planned for operating under the lowest continuous rates of electric supply. Running costs, which will be guaranteed, can be definitely ascertained before installation.

The "Garnay" electric water heater is made in the following standard capacities: 20, 30, 40, 60, 80 and 100 gallon. Larger sizes or special arrangements to supply commercial processes can be provided.

The "HOT-O-MAT" Thermostatic Unit is of similar construction, but is arranged to store and supply hot water only.

**Oil Burning Equipment**

Hot water boilers may be fired by oil fuel, the running costs being approximately the same as for coke or briquette firing. Oil is usually stored in an underground tank filled by means of an oil fill line directly from the oil company's waggon, and provided with a level indicator; the whole system complying with the requirements of the Fire Underwriters and not affecting house insurance.

Practically no attention is required, a thermostat controlling the burner, a system which readily adapts itself to the depleted load in summer. A safety stack switch is provided as an added control to the system.

**Cast Iron Water Boilers**

These boilers are of heavy cast iron construction, each casting being subjected to special tests. The boiler is fitted on a solid cast-iron base. Dampers, which may be fitted with automatic regulators if required, are provided for controlling the fire. Fuel used is briquettes, wood or oil.



Cast-Iron Domestic Boiler.



Cast-Iron Sectional Boiler.

For Melbourne and surrounding districts, boilers which have been treated by a rustless process are supplied in order to resist the mineral and vegetable acids contained in solution in the water supply, which would tend to discolour the water in a plain cast-iron boiler. In some outlying districts, plain cast-iron boilers are suitable and can be supplied.

**Comparison of Different Types of Hot Water Systems**

Of the several heating agents available, such as briquettes, coke or wood fuel, gas, electricity and steam, each has its merits according to its location, suitability, convenience, and adaptability for economical working.

**COKE AND BRIQUETTE FUEL SYSTEMS.**—Where it can be used, there is no system that will give such excellent results, both from the standpoint of efficiency and economy, as that using coke or briquette fuel.

**GAS SYSTEMS** are highly efficient and convenient, and as our systems are invariably arranged with gas and water automatically controlled, they require no attention. Where coke or briquette fuel is unsuitable and the requirements variable, we recommend these boilers, their higher running costs being offset by the saving of labour and attention in firing and cleaning.

**ELECTRIC SYSTEMS** are very convenient—they take up little room, are clean, hygienic and particularly suitable when the demands for hot water are regular, over a period, and when circumstances determine that no attention is available for operating. This applies to what are termed "Continuous Systems," where a small amount of electricity is being used throughout the 24 hours, and for which specially low rates are charged by the supply authorities. Special "Boosters" are also installed to meet the need for unusual requirements.

**STEAM SYSTEMS** are limited to premises where steam is available. These systems are efficient and economical and, being automatic in operation, require little or no attention.

**GENERAL.**—As we manufacture equipment for all of these systems, and have no bias or agency for any particular one, we are able, from our wide experience, to advise the best system to suit the conditions under which it is to operate.

We will be pleased to assist in this regard, and quote for the complete installation.



## Installation

The proper installation of a hot water service is a vital factor in its successful operation.

Over 25 years' experience in the designs and installation of all types of hot-water systems enables us to safeguard every detail and to efficiently proportion pipe sizes, etc., so that the maximum efficiency may be gained from the service. The fact that we both manufacture in our own works with modern equipment and also install these services saves a division of responsibility and is a guarantee of service to our clients.

The outstanding features of the Gardner and Naylor distribution systems are as follows:—

**PIPE SIZES** are designed and proportioned to supply the requirements of the system and arranged to suit any treatment, feature or layout required by the architect.

**PIPE FITTINGS** are of brazing metal and all joints are brazed.

**INSULATION.**—Hot water pipes are efficiently insulated, especially in gas and electric systems, where insulation receives more than usual attention, owing to higher running costs.

**CIRCULATION SYSTEMS.**—Where the fittings to be supplied are widespread, it is usually found advisable to adopt a circulation system with which hot water is made available more promptly at the distant fittings.

Circulation systems, however, are not usually recommended in gas and electric systems, unless running costs are of no consideration. In these systems, it is possible to install the units in a position central to the fittings.

**COLD SUPPLY TANKS** are of copper or galvanized rustless steel, with safe under and overflow waste pipe for protection of ceilings.

**FLUES.**—Flue pipes from boilers are of heavy gauge steel, and have ample provision for cleaning.

**FITTINGS.**—Taps and fittings used in Gardner and Naylor installations are of the best type, heavily nickel-plated.

The following are optional fittings:—

N.P. hot and cold combination shower fittings, shower needle sprays, shower mixing valves, combination hot and cold swivel fittings for baths and sinks, towel airers and rails, N.P. sink standards, shampoo fittings, heaters for linen cupboards.

**FIRE UNDERWRITERS.**—Gardner and Naylor installations conform to the requirements of the Fire Underwriters' Association.

**GUARANTEE.**—Each Gardner and Naylor installation is guaranteed for efficient and proper operation.

## Service to Architects

It is often helpful, when planning a residence or building, to know what to provide for in a hot water service, both as regards construction, flues, floor space, etc. We are always pleased to recommend the type of hot water service best suited for the conditions operating and to give details of layout and the constructional features necessary for the installation.

It is generally desirable that this advice be given when the plans are in the preliminary stage.

## SEWAGE DISPOSAL

Sewage Disposal Systems are used in unsewered areas for the treatment, purification and disposal of house sewage.

The G. & N. System adopted is governed largely by local conditions, available water supply, the suitability of site for disposal of effluent, nature of soil, the requirements of local authorities, proximity to source of water supply, etc.

G. & N. Septic Tanks have been installed with the approval of the Board of Health and local governing bodies throughout Victoria and the Riverina, in large hotels, hospitals, institutions, factories and residences, and represent the accumulative experience of 25 years in this type of work.

It can be confidently stated that a G. & N. Sewage Disposal System can be, in one form or another, designed to suit practically any set of conditions.

### Bacteriolytic or Septic Tank

The G. & N. Septic Tank is designed to bring about the decomposition and consequent purification of sewage by a biological process.

The construction of the tank is either in brick work or concrete, made thoroughly waterproof with cement rendered interior; the arched top being reinforced. All stoneware pipe connections and fittings in the tank are provided with inspection openings, easily accessible for cleaning purposes. Manholes are fitted in the top for inspection and cleaning.

Various stages in the decomposition of sewage matter are associated with different forms of bacteria, which work in fairly regular succession. Chambers are provided in G. & N. septic tanks which provide the necessary conditions for the propagation and operation of the various bacteria. The tank is efficiently vented either through the drains or separately, to supply the necessary oxygen which is essential to the operation of the tank.

In some cases, an aerobic filtration chamber is fitted to the tank, in order to produce an entirely clear effluent. This, however, requires periodical attention.

### DISPOSAL OF EFFLUENT.

The method adopted for the disposal of the septic tank effluent is dependent on a number of factors. Where the neces-

sary area is available, and soil is sandy, loamy or porous, the effluent is usually disposed of below the surface of the ground by a subsoil irrigation distribution system. Care is taken in the preparation of the ground and the installation, that the system is always kept free to distribute as evenly as possible over the whole area. Precautions are also taken to prevent earth from getting into the lines and causing a blockage. When it is necessary to carry the effluent long distances or to a higher level an automatically operated pump is used. It is sometimes possible to sink a "drift," and where this is reliable and sufficiently close to the surface of the ground, it may be used for the disposal of the effluent.

### AEROBIC FILTRATION SYSTEM.

In some cases it is desirable or necessary to further oxidise the effluent. This is done in an aerobic filtration system.

The filter media must be of ample capacity and so arranged that it may be easily cleaned. The effluent is automatically and evenly distributed by a special form of trough, ensuring the efficient operation of the full area of the filter bed.

Careful design and periodical cleaning are essential to the proper working of an aerobic filtration system. If badly designed or neglected, it can readily become a menace.

### DISPOSAL OF WASTES.

While it is best, in our experience, to separate the house waste from the sanitary system, in larger works they can be combined under suitable arrangements.

The wastes from bathroom, kitchen, laundry, etc., are disposed in a similar manner to the effluent from the septic tank. Before being passed into the subsoil distribution system, the wastes are treated in a detritus chamber constructed of brick or concrete. Because of the greater quantity of water to be disposed, the subsoil treatment system is generally more extensive than for septic tank effluent.

### INSTALLATION, DRAINS, ETC.

The necessary drainage lines and the system of venting have also an important bearing on the successful operation of the installation.

The staff carrying out these installations is thoroughly experienced in every phase of the work, having been in the firm's employ for a number of years.

### GENERAL PLUMBING SERVICES—WATER SUPPLY AND STORAGE.

Gardner & Naylor are in a position to economically carry out the whole of the plumbing services incidental to any country residence or building. This includes the supply and installation of all the sanitary and toilet fittings, with their necessary waste and water supply connections.

Complete water supply and storage schemes, using engine or motor driven pumps, hydraulic rams, dams or windmills, are designed according to the source of water supply available and the conditions operating.

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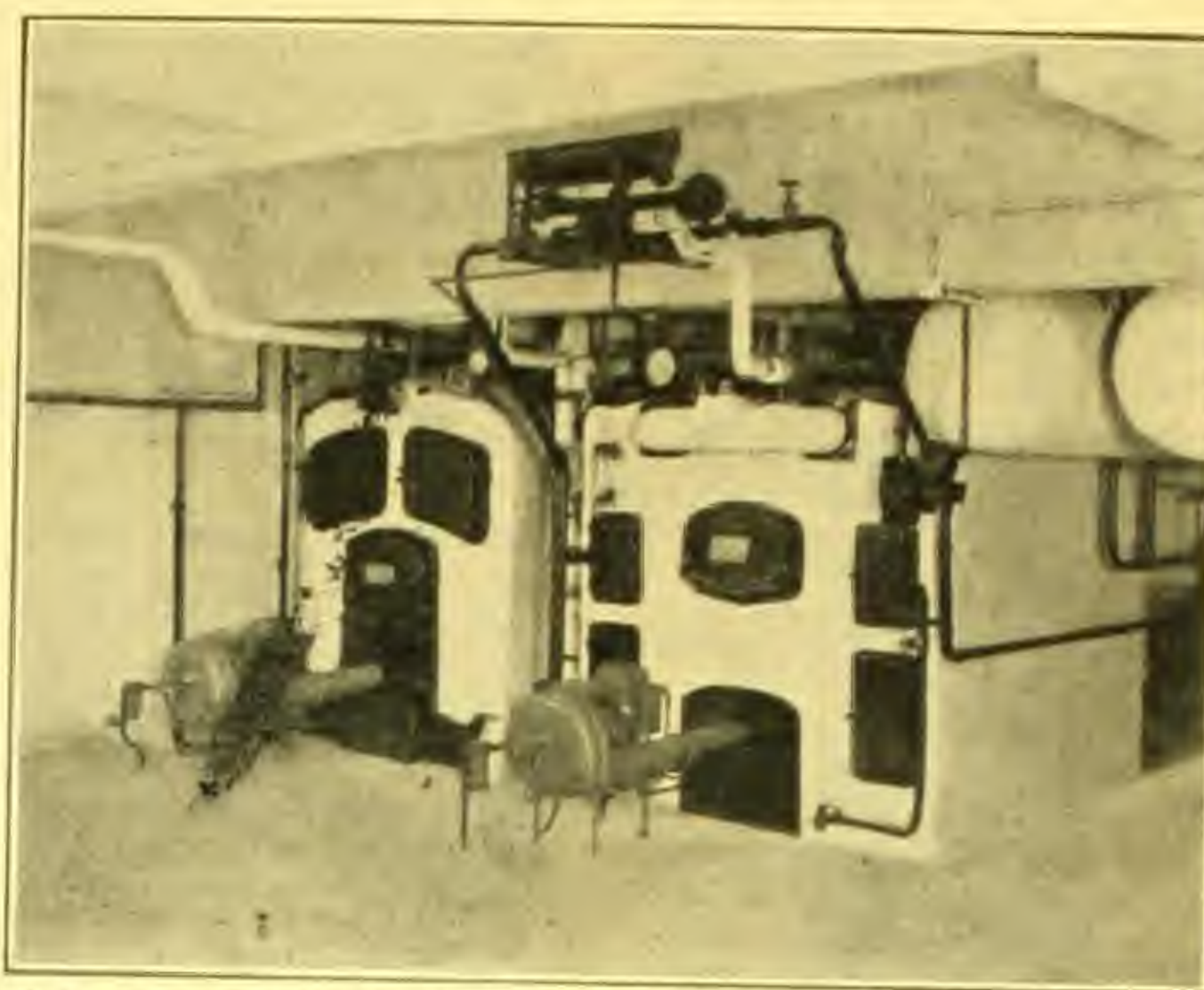
## HEATING INSTALLATIONS

### Hot Water or Steam

### GENERATION

There are a number of types of boilers available for generation of heat for general heating purposes, each having its peculiar suitability to the conditions under which it is to operate. Where direct heating or panel heating is adopted, i.e., where the heating unit is exposed in the room, hot water is usually the heating medium and hot water heating boilers used.

Where a combined heating and ventilation system or unit heater system is used, steam is often the heating medium (although hot water is also suitable for these systems) and steam boilers are used. Steam is the best medium for heating drying rooms for commercial processes.



Cast-Iron Sectional Heating and Steam Boilers fired by Oil Burners. Hot Water Supply Calorifiers at Ceiling (right).

#### Cast-Iron Boilers

Cast-iron sectional steam and hot water boilers are most largely used for general heating purposes. The advantages of this type of boiler are: Low Cost, Flexibility (when load is increased they can be easily enlarged by adding extra sections); Ease of handling; Can be taken through doorways and openings large enough to take one section.

These boilers are composed of a number of independent sections connected in such a manner that the group will operate as one unit.

Cast iron, which is subjected to special tests, is used throughout. Ample provision is made for cleaning flue passage. The fire is readily controlled by dampers on flue and ash pit doors. Automatic damper regulators can be supplied if desired.

A neat, square, galvanized steel casing is supplied with the boiler if required, which covers the insulating layer and adds to the neatness of the boiler appearance.

Heating efficiency is gained in these boilers by the long flue travel of the flue gases and efficient heating surfaces.

A two-way flue adapter is provided at the rear of the hot water boilers, with which it is possible to connect horizontally direct into a brick stack to suit the layout.

These boilers are usually set up on a brick or concrete base, in which is formed the ash pit.

The ample areas of the waterways of each section permit of free and rapid circulation of water. Water-cooled firebars prevent burning out.

These boilers are suitable for installation in which the static head is not more than 120 feet (i.e., the cold supply tank is not more than 120 feet above the boiler).

#### Steel Boilers

For static heads greater than 120 feet, Colonial Underfired and other types

of steel boilers are used. These boilers are also selected for large installations (which would require more than one sectional boiler) in order that only one boiler would be required. This would mean a saving in floor space and also, if oil fired, would save the extra oil burner.

**COLONIAL TYPE.**—The boiler shell is constructed of heavy steel plate and usually requires building in brickwork. The combustion chamber is situated beneath the boiler shell, and by means of baffles, the heat generated by the combustion of the fuel is directed against the underside of the boiler shell.

After leaving the combustion chamber, the gases pass through a number of steel tubes, which are expanded into the end plates of the boiler shell. In the single return type of boiler, the gases pass from the tubes into the smokebox and flue, which is situated at the firing end of boiler. In the double return boiler gases return through another set of tubes to the smokebox at back of boiler.

Large smokebox doors give access to tubes for cleaning and inspection. Double firing doors are provided for stoking.

## DISTRIBUTION

#### Circulation Pipe Systems

Circulation pipe systems may be either gravity (or natural) circulatory or pump accelerated circulation system. Selection of system depends on size or layout of installation. Small installations do not warrant the use of pumps and work on gravity circulation.

In larger installations, the cost is greatly reduced by adopting the pump accelerated system. Pipes are smaller—quick circulation and quicker heating.

Widespread installations with radiators on same level as boiler usually require a pump.

#### Panel Heating

Panel Heating is a method of using radiant heat, first developed in England about twenty-five years ago, and since widely used.

It has long been demonstrated that true radiant heat—that is, heat moving in straight lines from its source and not heating the air in transit—can keep the human body quite comfortable at an air temperature much lower than when this heat is conveyed by means of warmed

air, which is the medium by which we are warmed under the ordinary, hot water or steam (so-called) radiator systems.

Our own experience proves this. On a cold day, in the sunlight, one is quite comfortable, and yet if that sunlight is for a moment obscured by a cloud, the colder temperature of the air is at once apparent.

**Method:** This radiant heat is effected by fitting into the ceilings, steel pipes of a special formula bent, welded and laid on the top of the forms, and cast into the concrete plate.

By our own patented process, any linear expansion of these coils is taken up, without harm to the plaster or the concrete plate itself.

The Panel System has now a wide vogue throughout Great Britain, and is being taken up on the Continent, and also in America, and Engineering and Building Journals indicate that quite a large proportion of the best construction in Great Britain in the last ten or fifteen years has been warmed by the panel system.

This type of work requires more skill on the part of the actual workmen, and we have, by experiment and training, developed methods and staff to safeguard the efficiency and quality of this work.

The Panel System uses hot water as the medium, and the standard boilers and burners are used. Special controls are necessary to accurately control the temperature.

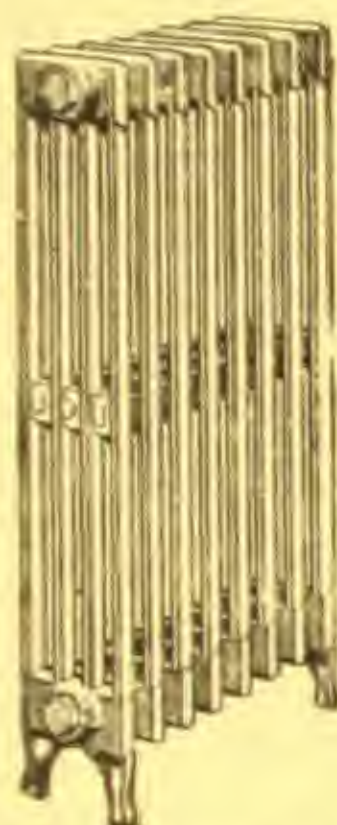
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## DISTRIBUTION—(continued)

The "RAY RAD" Cast-iron Radiators, designed to produce similar effects to the panel system, have been developed for fitting on ceilings and walls, and are now widely used in Great Britain. These require skill and understanding to make an effective and trouble-free installation.

## Cast-Iron Sectional Radiators



Modern Type of  
Cast-Iron Sec-  
tional Radiator.

Cast-Iron Sectional Radiators are the most popular form of heating units. Made up to suit the size and heat losses of the room in which situated. Heat losses are calculated by factors for construction, exposure, etc., also take into consideration desired room temperature, and minimum outdoor temperature. Radiators altered in size by adding or removing sections.

In selecting positions, compactness of layout should be the aim, because this lessens cost of installation. Positions of radiators for maximum efficiency recommended may be modified, however, to suit position of furnishings.

Radiators may be placed in recesses, or with architectural pattern registers in cabinets. If so,

size must be increased, as heating efficiency is reduced. Modern radiators with slender columns present improved appearance to old types.

Radiator mountings, valves, etc., are nickel-plated, pipe connections to radiators, where they pass through walls, are fitted with nickel-plated flange plates.

## Electric Hot Water Radiators

These are of the cast-iron, sectional type, and can be supplied in sizes to suit the location.

## Copper Fin Heaters

"GARNAY" Copper Fin Air-heating Batteries have practically replaced the heavier and bulkier cast-iron types. They have been used successfully in combined heating and ventilating systems in City Buildings,

Theatres, Hospitals, Factories, etc., also for Drying Rooms.

"Garnay" Heaters are made up of units of standard sizes. Each unit consists of a series of copper tubes connected between flow and return headers, on which copper elements are fitted. The whole unit is tinned and is supplied in casing ready for connection to ducts and pipes.

The number of units required, and their arrangement in the heater, are dependent on the quantity, velocity and temperature of air to be heated.

A "Garnay" heater, easily carried by one man, will effectively do the work previously required by a cast-iron heating battery weighing half a ton.

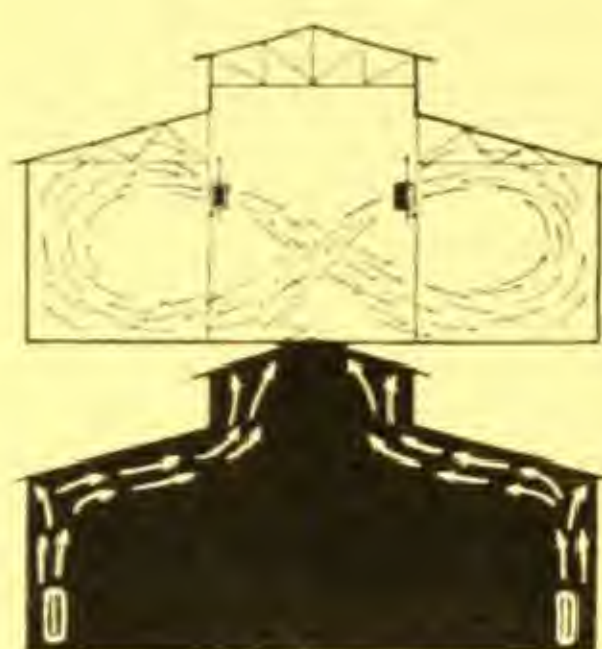
These heaters are suitable for use with steam up to 120 lbs. per sq. inch pressure, and also hot water. They can also be supplied for higher pressures.

## Factory Heating

UNIT HEATERS are most suitable for factories in which large spaces are to be heated and few or no partitions divide up the space. This system heats quickly and gives a positive circulation of heated air at working level, as shown in diagram, which compares radiator heating to heating by means of the "Garnay" unit heater in a large undivided building such as an industrial plant.



The "Garnay"  
Unit Heater.



The "GARNAY" Unit Heater illustrated consists of a finned copper heating element enclosed in a neatly finished steel frame. Air is blown through the heating element by an electric fan mounted on one side of casing by means of radial steel arms. The air flow is directed by adjustable louvres mounted on the opposite side of frame to motor. This system of heating and air circulation is usually the least costly to install.

## DIMENSIONS—

Standard—31 in. x 25 in. x 18 in. deep.

Junior—26 in. x 20 in. x 18 in. deep.

The heating capacity of these units is dependent on steam pressure or water temperature.

Send for descriptive matter.

## Drying Rooms

The heating requirements of drying rooms depend on variable factors such as time required, temperature limits, method of handling, and heating medium available. They are specially suitable in chemical and soap factories, hosiery mills, laundries, potteries, woollen mills, paint shops, timber and cabinet works, tanneries, boot factories, club dressing rooms, etc.

G. & N., from a wide experience, are in a position to design the arrangement best suited for any particular case.

The articles to be dried may be arranged on trolleys, wire belts, gratings, horses, hooks, clips, etc., etc., and drying is effected by air change and heat from pipes, radiators, batteries, using hot water, steam, gas or electric heat. Fuel stoves are also used.

## Heating Stoves

Small factories may be heated by cast-iron, slow-combustion stoves, fired by briquettes or coke.

These stoves, which are inexpensive both to install and operate, are usually fitted in a central position in the apartment, a flue being carried from each fitting.

The number required is dependent on the size and area to be heated.

The construction is cast iron, lined with fire brick, and the dimensions 18 in. x 14 in. x 34 in. high.

## Gas Heating Systems

Are suitable for heating areas of moderate size. They are also used in small drying rooms for factories, etc.

## Electric Heating

Is used for specialised processes where automatic and accurate temperature control is essential.

(Continued on next page)



## MECHANICAL VENTILATION

## DESIGN AND INSTALLATION

## Importance of Mechanical Ventilation

Adequate ventilation is of ever-increasing importance, as the standards of comfort and health are now more exacting than ever before.

In plenum or pressure system of ventilation, in which air is supplied to areas to be ventilated, the chief factors concerning the air itself are temperature, humidity and air motion. In exhaust systems in which the air is extracted the principle impurities that demand attention are dust, bacteria and odors. In many public halls, theatres, and the like, in basements where the general public congregate, such as shops, showrooms, etc., ventilation is required by the Public Health Authorities.

The principal advantages of mechanical ventilation are: (a) positive circulation of air (at desired temperature if necessary) to all parts of the building, (b) practical uniformity of ventilation regardless of atmospheric conditions.

Experience and knowledge of all the requirements are particularly vital to the efficient design of ventilation systems.

## Gardner &amp; Naylor Ventilating Systems

Gardner & Naylor Ventilating Systems are planned in the light of experience gained from hundreds of installations carried out in city buildings, offices, factories, kitchens, chemical plants, residences, etc.

Points which receive special attention are:—

Quiet operation of both the fan and motor units, ducts adequately supported, firmly fixed and designed so that the least possible resistance is offered to air movement, systems balanced and controls arranged to give free flow and even distribution of air to all outlets. Initial cost can be saved by using high-speed fans and motors, but the noise from such fittings can become a costly nuisance. Ample duct capacity is also arranged to save noisy air velocities.

## Description of Systems

Ventilation actually consists of the displacement of vitiated air from an apartment and its replacement by fresh air. This is done in a mechanical way, by either a plenum (blow in) or an exhaust system, or better, by a combination of both.

**PLENUM.**—In cases where it is desired to treat the air in any way, either by heating or air conditioning, the plenum system is usually adopted.

The layout of the system depends on the building construction and type of apartments to be ventilated.

The usual method is to have the main air inlet as high in the building as possible, preferably at or above the roof level, so that air coming into the system will be as pure as possible. In order to insure that the air will be pure, it is often passed through an air washer or a viscous or other type of Air Filter.

The movement of the air is maintained by means of various types of fans, usually of the multi-vane centrifugal type, which force the pure air through the system.

In planning a plenum system it is necessary to make provision for natural outlets through which the incoming air will displace the vitiated air.

The efficient distribution of air is of special importance, and each room and building requires careful and independent consideration.

**EXHAUST.**—Exhaust Systems are selected for areas in which the vitiated air is a definite nuisance and requires almost immediate removal, such as in Lavatory Blocks, Hotel Kitchens, Chemical Works, etc. Exhaust systems are usually very positive in order to prevent the odours and gasses from finding their way into other parts of the building.

The vitiated air is collected by hoods or registers placed in suitable positions, which are connected by a duct or series of ducts to the exhaust fan which forces the air to the external atmosphere.

It is of great importance that the vitiated air be exhausted in such a way that it cannot find its way into the building again through any plenum inlets and that it will not be a nuisance to surrounding buildings.

Where conditions are suitable, it is possible, by using a propeller type fan, to exhaust from the vitiated area through the wall to the outer air.

In exhausting from kitchens it is usually necessary to place collecting hoods over some of the fittings. The balance of ventilation is done by inlet register placed in ducts at or about the ceiling.

**COMBINED PLENUM AND EXHAUST.**—Where a positive air movement is essential, and for large installations, the combined plenum and exhaust system is usually adopted.

By this system a positive circulation of air is set up, thus causing a continuous flushing of the apartment.

**COMBINED HEATING AND VENTILATING.**—No system will warm a building more quickly or more effectively than a combined heating and ventilating system. This is a distinct advantage in many cases, especially where the building is allowed to cool down over night.

This system is suitable from a heating point of view for rooms or halls of great height where the radiation or panel heating systems are not so suitable. An advantage of this system is that a uniform temperature is obtained.

The air is heated by means of a heating battery placed at some convenient point in the main air duct. The battery is heated from a steam or hot water boiler.

G. & N. Copper-fin Heating Batteries are specially suited for this work and have been used in many large heating systems.

## AIR WASHERS.

Air Washers are generally used in conjunction with ventilating systems for public buildings, hospitals, offices, etc., where it is imperative that the air supply is pure. Air Washers have the effect of cooling the air. Air Washers also increase the percentage of humidity, which can be controlled to give the desired humidity for the required final air temperature.

The Gardner & Naylor standard air washer consists of a spray chamber in which the air is cleansed of its dust by passing through a fine misty spray obtained from a large number of uniformly spaced centrifugal nozzles.

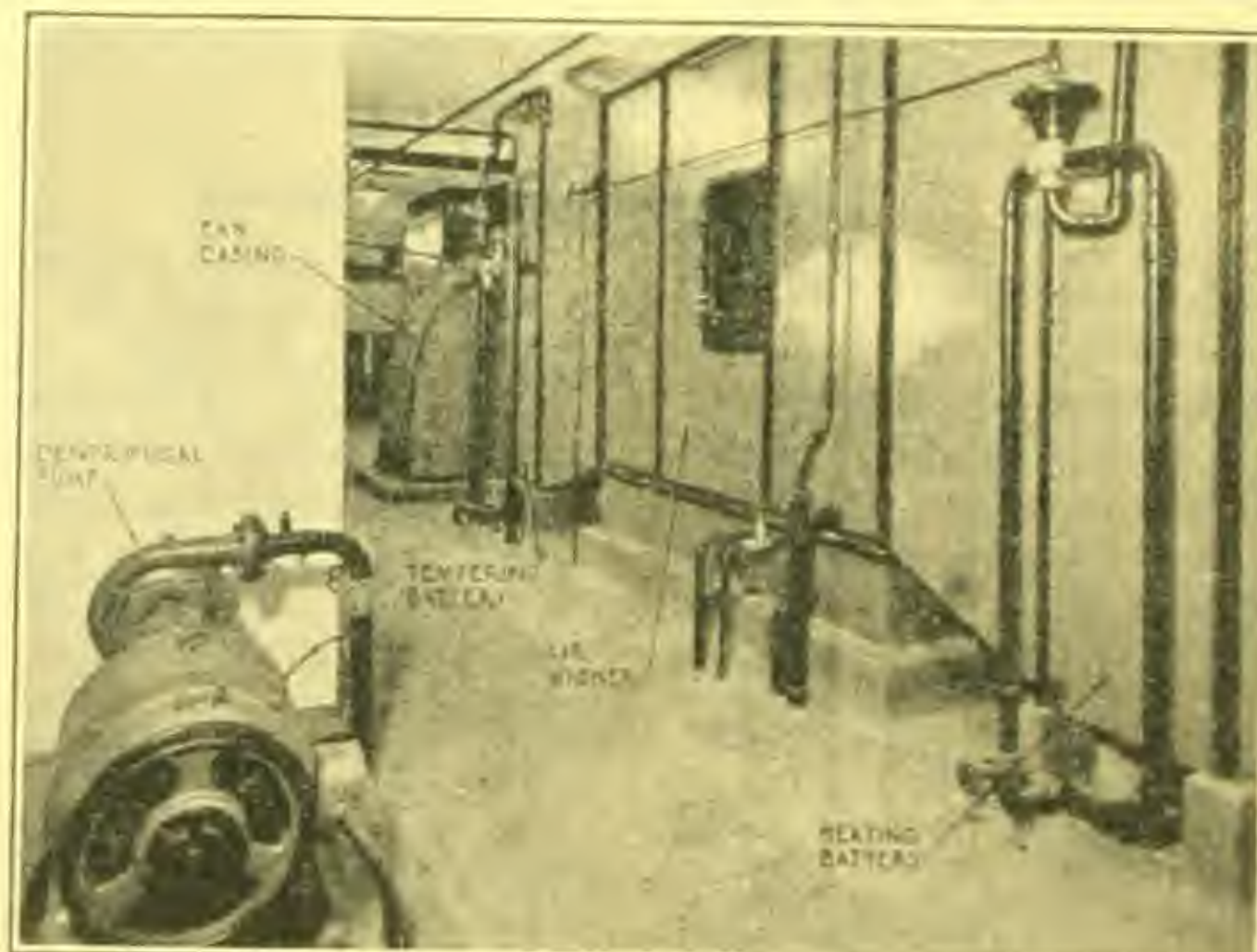
A motor-driven centrifugal pump supplies the water, after passing through a strainer, to the nozzles at high pressure. From the spray chamber the air passes through a series of scrubber or eliminator plates, which remove any remaining dust, and finally remove any free moisture in suspension which has been carried from the spray chamber. They are continually flushed by a stream of water which removes collected dust particles. A settling tank for the spray water completes the air washer.

## AIR FILTERS.

Air Filters differ from Air Washers in that they are designed to purify the air but not to treat it in any other way. An air filter consists of a number of units which contain a series of oil-film-covered baffles for filtering the dust particles in the air stream.

The units, which are removable, are regularly spaced in a framework consistent in area with the permissible air velocity. It is possible to remove 98 per cent of the dust particles by this method.

After being in operation for two to three months, the filter requires cleaning. This is a simple operation, as the easily handled units are slipped out from the frame, replaced with spare units, washed in a cleaning solution, dried, recharged with adhesive liquid and replaced in the framework.



G. &amp; N. Air Conditioning Plant.

one or two at a time from the frame, washed in a cleaning solution, dried, recharged with adhesive liquid and replaced in the framework.



### Air Conditioning or Manufactured Weather

Air conditioning takes into consideration the following variable factors—Temperature, Relative Humidity, Purity and Air Motion.

It is the science of treating the air in order to obtain a required condition of air independent of atmospheric conditions.

The desired conditions are obtained by means of air washers, air filters, humidifiers and some form of heating battery.

Air conditioning, as well as being desirable from the standpoint of health and comfort of humans, is applicable and often essential in many manufacturing operations.

Rates of production have been made uniform, production efficiency has been increased and the quality of the product has been improved by air conditioning installations. In textile mills, printing, baking, flour-milling, air conditioning has a special application.

By means of automatic control devices, it is possible to obtain a desired condition of the air and maintain it quite automatically to a very fine degree.

#### HUMIDITY AND HUMIDITY CONTROL.

As an added refinement for human comfort the humidity or moisture content of the air must be maintained at the comfort standard.

In many manufacturing concerns humidity plays a prominent part. The amount of moisture required in industry, however, varies widely according to the nature of the process. The advantages which may be obtained as a result of an efficient humidity control system are:—time of manufacture reduced, quality of product increased, less breakages and waste in silk and fibre products, saving in reduction of weight by moisture loss.

The desired degree of humidity is obtained by means of humidifiers and air washers, which can be automatically controlled by humidistats or other devices to maintain the relative humidity at the required standard.

#### DUCT WORK.

Ducts are designed and proportioned to give a free flow of the correct quantity of air to the register outlets. Accurate proportioning of ventilating ducts is of great importance in order that each outlet may have its right share of air at the correct velocity.

The velocity of air in a duct is governed by the quantity of air and the cross section of the duct. Where quiet operation is desired, the velocity of air in the ducts is fairly low. Sharp bends are avoided. Where ducts are of large proportions,

heavy gauge metal is used with adequate angle iron or other supports to prevent sagging and rattling under suction or pressure. In special installations where the ducts are to be of great permanence, and also where built into the construction, they are constructed of a special rustless iron alloy or in concrete.

In new buildings it is usually possible to form main ventilating shafts in the building construction while branch ducts of galvanized sheet iron can often be covered by some plaster treatment so that all ducts are concealed.

Register faces, which may be of stamped steel, cast bronze or plaster cast and of designs to suit the decorative motif, are of ample free area, i.e., the orifices through which the air can pass, in order that the required quantity of air is delivered into the room.

#### DUST AND FUME REMOVAL SYSTEMS.

In dust and fume exhausting it is necessary that the system be more positive and the whole construction of ducts, etc., be heavier and more rugged than in ventilation systems. High-pressure fans which are able to create greater suction are used.

In some industrial processes the fumes and gases resulting from the process must be collected before it is possible for them to find their way to other parts of the factory. In cases such as this, collecting hoods are placed over the apparatus from which the fumes arise. Special high efficiency hoods with greater suction at the edges are used where necessary.

In cases where the fumes are of such a nature as to be injurious to the fan and duct work special metals are used.

In dust removal systems from timber mills, engineering shops, etc., high air velocities are essential for efficiently collecting the shavings, dust, etc., at the machines and for conveying them through the heavy gauge ducts. Hoods specially designed to suit the operation of the particular machines are provided and connected to the heavy duty dust fan by a system of duct work.

Dust separators to Gardner & Naylor standard of heavy construction and high efficiency are provided for separating the dust from the air stream.

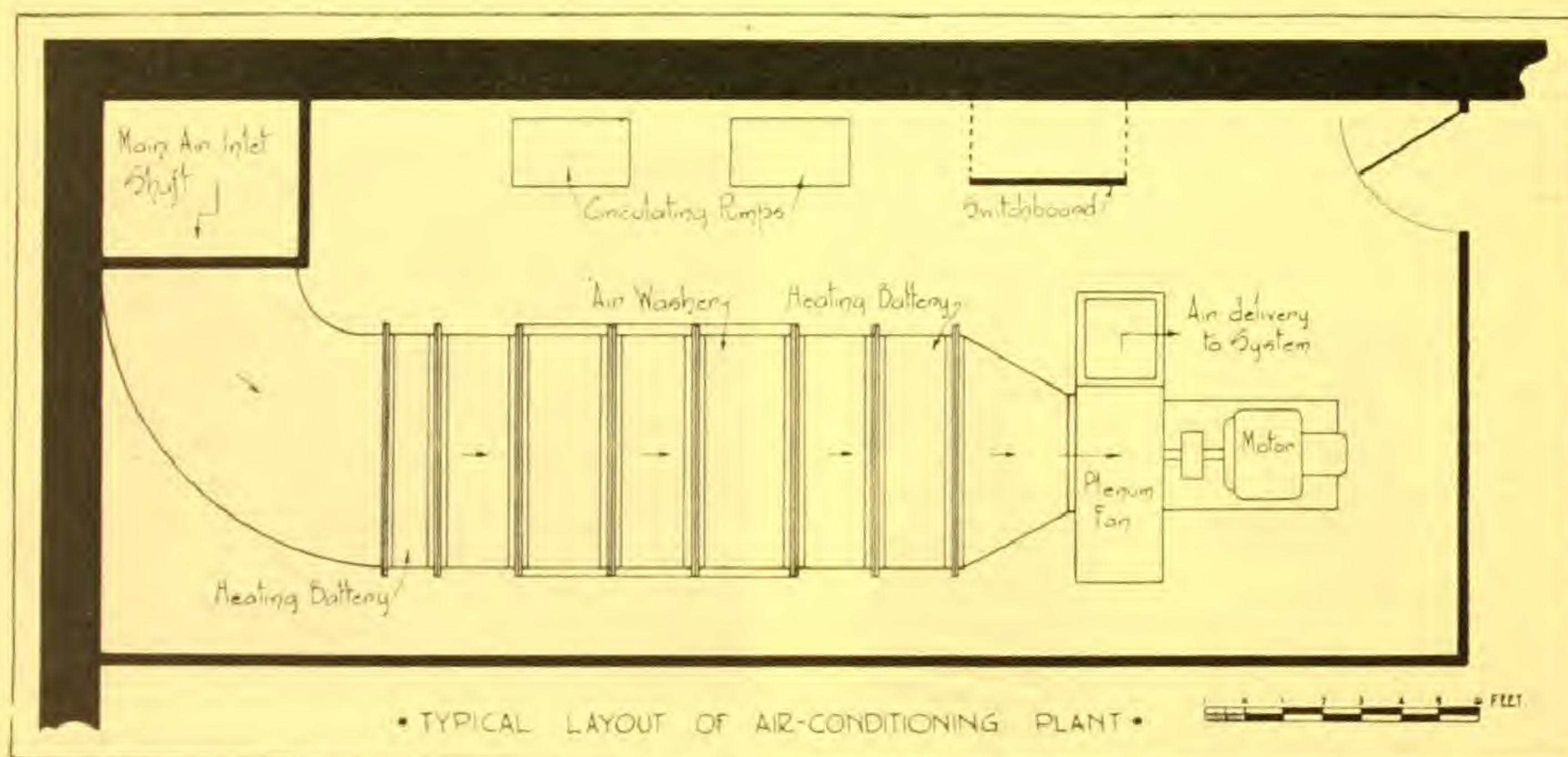
CONVEYING SYSTEMS using a dust type fan and a series of ducts is often suitable for conveying light materials from place to place.

INDIRECT SYSTEMS.—It often occurs that the fumes are highly inflammable and it is necessary to use an indirect system in which the fumes do not pass through the fan where a spark might ignite them.

This is done effectively by means of the syphon or evase tube method.

#### SERVICE TO ARCHITECTS.

Gardner & Naylor are always pleased to advise the ventilating system or systems best suited for any set of conditions and to plan the necessary ducts and fan room, etc., so that they may be included in the constructional plans or allowed for in the general design.



• TYPICAL LAYOUT OF AIR-CONDITIONING PLANT •

Our service covers the preparation of drawings for heating and ventilating layouts as exemplified by the above drawing prepared by our engineering staff.



30d

S.A.A. File No.

**A. E. ATHERTON & SONS PTY. LTD.**

383 LATROBE STREET, MELBOURNE, VICTORIA

**Complete Heating and Ventilating Equipment  
and Installations****"ATHENA"**  
Trade Mark

[For Other Products, See Pages 300 and 472]

**COMPLETE HEATING AND VENTILATING INSTALLATION CONTRACTS**

A. E. Atherton & Sons Pty. Ltd., having been for many years associated with the installation of varying types of heating and ventilating equipment, have gained a thorough and comprehensive conception of the work involved and, through this experience, they are in a position to undertake all phases of work required in the installation of the complete equipment of any ventilating, air conditioning, or heating system.

A special branch of the work that this firm is prepared to undertake is that of the construction and

installation of ventilating duct work. This requires a detailed knowledge of all the work involved in the construction of graduations in changes of section and direction, which all form an important part in the true functioning of the system. All this construction is carried out according to specifications by skilled men under careful supervision.

If required, A. E. Atherton & Sons Pty. Ltd. are prepared to offer advice and suggestions in the preparation of the design of any heating or ventilating installation.

**THE "ATHENA" UNIT HEATER****The "Athena" System of Unit Heating**

The underlying principle of "Athena" unit heating is to deliver, without waste, a large supply of evenly distributed heat by air movement. This is accomplished by suspending unit heaters at desired locations on the hot water or steam supply lines, from whence heated air is discharged down to the floor and circulated throughout the entire working area. The heated air then rises and, as it reaches the level of the heaters, it is drawn in by the fans and again discharged downwards.

A constant circulation of warmed air is thus maintained and, owing to the method of recirculation, very little heat has the opportunity of escaping from the working area and being wasted at the ceiling.

This principle of unit heating is adaptable to all classes of industrial buildings. It is also of great assistance in accelerating drying operations in various plants.

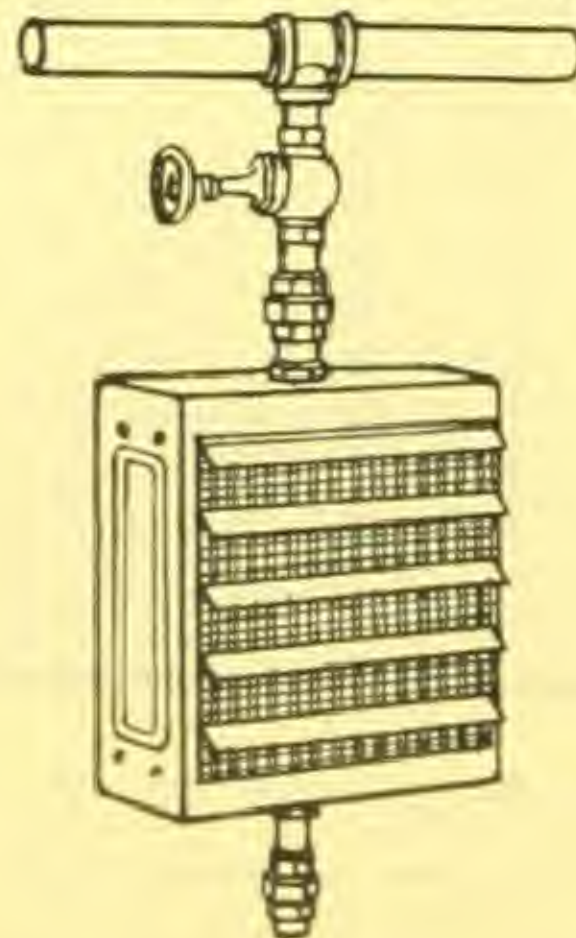
**Construction of the Heater**

All the good qualities of high-grade materials and thorough workmanship are embodied in the construction of the "Athena" unit heater. Briefly it consists of a copper condenser mounted in a strongly constructed supporting frame, upon which the fan and motor assembly is supported. The condenser, consisting of seamless copper tubes with copper fins tinned on, baffles the air as it passes through and causes it to come in contact with the heat-giving surfaces. The heated air is deflected down by the adjustable louvres at the front of the unit.

The unit is constructed in a range of models suitable for covering the requirements of the replacement of 1,390 sq. ft. of cast-iron radiation and delivery of 3,500 cub. ft. of air per minute, down 144 sq. ft., and 300 cub. ft. per minute respectively.

**Thermostatic Control**

Automatic temperature control may be secured by placing a thermostat in the electrical circuit which supplies the motor of the heater. This control will maintain any desired room temperature.

**Advantages**

The main advantage of the "Athena" system of unit heating over cast-iron radiators and similar types of radiation is that of heat economy and wider distribution. Warmed air travels upwards, with a consequent gathering at the ceiling where it is not wanted. It thus follows that a large amount of heat must be produced in order to warm the working areas below evenly and thoroughly. This method—slow and expensive—is not to be compared with quick, direct and consistent distribution of heat provided by the "Athena" system of unit heating.

Due to their large heating capacity, comparatively small size and ease of installation, "Athena" unit heaters ensure lower operation and installation costs than their equal in cast-iron radiation.

**Installation**

The "Athena" unit heater is simply installed, as it is sent out completely assembled ready for suspension from the supply main. After the main supply and return have been run, the installation consists only of making up unions at the supply and the return from the heater, and making the electrical connection.



"Athena" Unit Heater installation in a Melbourne Machine Shop. A uniform distribution of heat always under control.

(Continued on next page)



**"ATHENA" COMPRESSION FITTING****Uses of Fitting**

The "Athena" Compression Fitting manufactured in high-grade gunmetal for making joints in steam hot water and all engineers' brassware.

**Making the Joint**

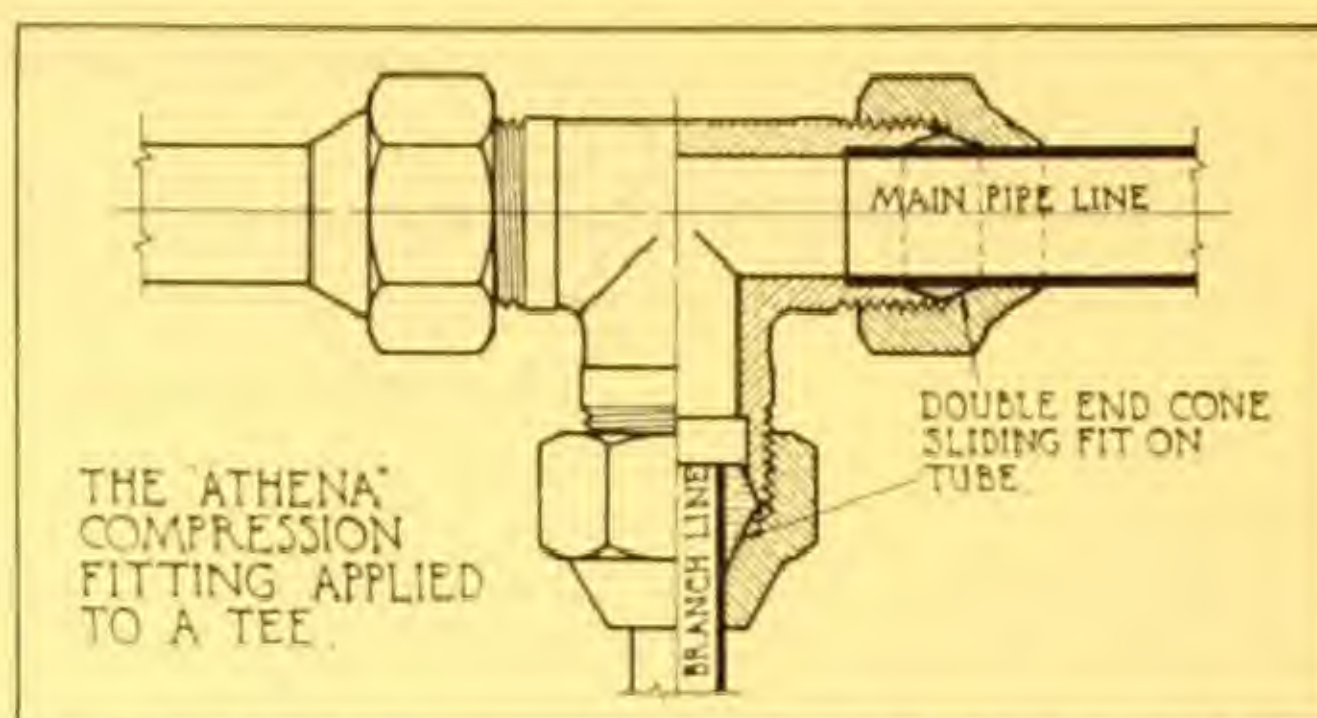
To make a joint with the compression fitting is very simple. The nut or female end of fitting is slipped over tube and the loose double end cone fitted to tube as shown in drawing. The nut is then screwed up outside the male end of fitting, making a perfect water and steam-tight joint.

The only tool required for making this joint is the wrench used to screw up the nut, thus speeding up and simplifying pipe work considerably; as there is no screwing or brazing to be done, a lighter gauge tube may be used throughout the system.

**LIST OF FITTINGS AND SIZES**

The following can be supplied with compression fittings in sizes to suit  $\frac{1}{4}$  in. to 3 in. diameter tubes:—

M. & F. Union Elbow; Breeching Piece, Union Tee. For tubes over 3 in. diameter, a special flanged fitting is supplied.



The "Athena" Compression Fitting applied for reducing from main pipe line to a branch supply.

**CENTRIFUGAL PUMPS****Products**

Rigid standards of quality and sound engineering is employed in the manufacture of our centrifugal pumps.

We manufacture both horizontal (single and multi stage) and vertical or submerged type, the latter for pumping out sumps, pits, etc.



A CONTRAST IN PUMPS.

The illustration shows a 3-in. multi-stage centrifugal pump used for re-circulation in the air-conditioning plant at the Melbourne Town Hall and capable of delivering 12,000 gals. per hour against a 60 ft. head. Motor is a 10-H.P. operating at 600 R.P.M.

The small unit in front is a  $\frac{1}{2}$ -in. single-stage pump, used for an accelerated Hot Water heating job. It delivers 5 gals. per min. against a 5 ft. head. Motor is a  $\frac{1}{16}$  H.P. operating at 1,400 R.P.M.

**Features of Construction**

Ring oil bearing, ball bearing thrust, stainless steel shaft, long packing glands. The construction of the trunnion allows the discharge outlet to be placed at any desired angle. Casing cover and bedplate of cast iron, machined where required. All rotating parts balanced.

**Power Application**

Direct driven through flexible coupling, with electric motor.

**Types**

Single stage pumps to multi stage. Pumps suitable for low, medium, high pressure work.

**Sizes and Capacities**

$\frac{1}{4}$  in.—4 in. single stage, 10 gals. to 200 gals. per minute.

$1\frac{1}{2}$  in.—3 in. multi stage, 50 to 200 gals. per minute.

**ENGINEERS' BRASSWORK****RADIATOR VALVES**

Nickel-plated Angle Radiator Valves—sizes  $\frac{1}{4}$ ,  $\frac{3}{8}$ , 1 in. Nickel-plated Fullway Straight Radiator Valves—sizes,  $\frac{1}{4}$ ,  $\frac{3}{8}$ , 1 in. Nickel-plated Key Pattern Radiator Air Cocks—size,  $\frac{1}{4}$  in. Nickel-plated Automatic Radiator Air Valves—size  $\frac{1}{4}$  in.

**GAUGES**

Combined Altitude Gauge and Thermometer—suitable for altitudes 0-175 ft. Altitude Gauges—Brass-Cased—Sizes, 4, 5, 6 in. dial. Brass-Cased Pressure Gauges—Readings to specification—Sizes, 4, 5, 6, 8 in. dial. Brass-Cased Combined Pressure and Vacuum Gauges—reading 30 lb. pressure; 30 in. Vacuum size, 4 in. dial.



Nickel-plated  
Straight Fullway  
Radiator Valve.



Nickel-plated  
Radiator  
Union  
Elbow.



Nickel-plated  
Angle  
Radiator  
Valve.

**BRASS-CASED THERMOMETERS**

8 in. x  $\frac{1}{2}$  in. Thread, plain, straight.  
8 in. x  $\frac{1}{2}$  in. Thread, plain, straight.  
8 in. x  $\frac{1}{2}$  in. Thread, plain, angle.  
8 in. x  $\frac{1}{2}$  in. Thread, plain, angle.  
8 in. x  $\frac{1}{2}$  in. Thread, revolving, shutter, straight.  
8 in. x  $\frac{1}{2}$  in. Thread, revolving, shutter, straight.  
8 in. x  $\frac{1}{2}$  in. Thread, revolving, shutter, angle.  
8 in. x  $\frac{1}{2}$  in. Thread, revolving, shutter, angle.



# MALLEYS LIMITED

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S.A.A. File No.

ALL  
RED  
FANS

*Dependable Equipment for Moving, Cleansing and Conveying Air*

[For Other Products, See Pages 98 and 263]

## Products

Manufacturers of All Red volumetric high efficiency Fans and Exhausters for mechanical ventilation. All Red high pressure Blowers and Exhausters for dust, shaving, fume removal and grain conveying. Air Washers, Unit Heaters, De-humidifiers, Viscous Filters and all Ventilating Requirements.

## Specialities

**Multivane Fans.**—The Malley Multivane Fan is designed for moving a large volume of air through ducts or piping against moderate resistance with the least possible expenditure of power. It is the most efficient large volume fan made.



Multivane Fan Wheel.

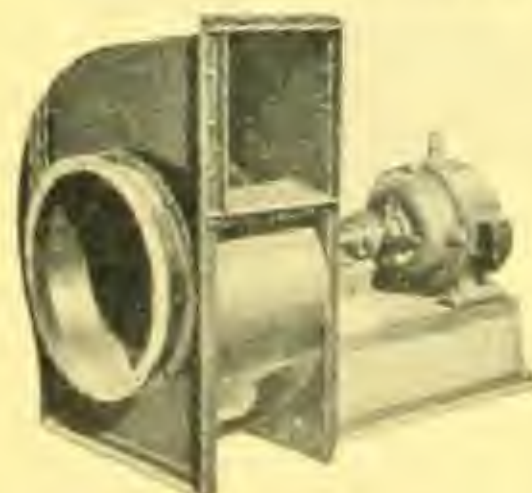
We have supplied these fans for ventilating plants, heating and ventilating, drying by warm air, smoke, steam and fume removal plants and many other applications.

The Wheel is a special feature, being made up of a number of blades having the depth tapered to ensure an even and uniform flow of air across the whole width of blade. As a result of our 30 years' experience of Fan Building we have evolved a rugged, long-life Fan with all parts specially heavy to avoid any possibility of vibration or noise.



"Standard" Multivane Fan.

The "Direct Connected Electric Fan" has the wheel or motor keyed on to the motor shaft and is used in cases where an economical installation is desired.



Direct Coupled Multivane Fan.

The "Standard Fan" is arranged for belt drive with pulley on either side and with outlet arranged at any desired position.



Direct Connected Multivane Fan.

The "Direct Coupled Fan" is arranged with extended shaft and flexible coupling and may have the fan base extended to accommodate the motor or the motor may be mounted on a separate base.

## Planing Mill Fans and Exhausters

Planing Mill Fans or Exhausters are rugged, heavily constructed fans evolved by "Malleys" for dust collecting and conveying or for collecting the dust and chips from woodworking machinery and for dust removal from road material, crushing and mixing plants, boot and shoe machinery and for the handling of hot gases, and for the removal of dust and dirt from coal, cereals, etc.

These fans are made right or left handed and with outlets arranged at any desired position, and can be supplied "Standard" with belt pulley. "Direct Connected" with fan Wheel bored to fit motor spindle or "Direct Coupled" arranged with Coupling to Connect to coupling or Motor spindle.

## Propellor Fans

When it is required to move large volumes of air against low resistance, the Malley propellor fan is the most efficient.



Direct Connected Propellor Fan.

Designed to incorporate 20 years of aeroplane propellor experience, the results obtained are gratifying, and the ease of application to direct connected drive has resulted in a growing demand for these fans for Paint Spray work in addition to ordinary Ventilation requirements. They are also used for exhausting foul air, heat, fumes and smoke, and for creating a breeze clean and fresh for cooling and drying.

Ordinary "Propellor Fans" are supplied with Rings and belt pulleys. Direct connected fans are furnished to meet special requirements. Roller chain and silent V belt drive Fans are used for Paint Spray Booths, etc.

## Narrow Width Exhaust and Narrow Pressure Fans

To meet the demand for Fans having a comparatively small output against high maintained resistances, the "Malley" Narrow Width "Exhaust" or "Planning Mill" Fan has been evolved, and these fans are in use for air supply to furnaces in addition to the ordinary dust and chips removal plants. Cases and Runners are extra heavy to ensure long life under the arduous conditions usually met with. Made left or right hand and with outlet discharging in any direction. Ordinary narrow width exhaust fans are fitted with belt pulley. Direct connected and direct coupled fans supplied to customer's requirements.

## Air Washers

Principally used for filtration of air in connection with ventilation systems or for air washing in plenum heating and ventilating plants.

They are highly efficient and maintain good results continuously, extracting practically the whole of the mechanical impurities of the air passing through them.

The atomising sprays are of the "Vortex" non-clogging type, and the large capacity filters are easily accessible for cleaning.



### Water Cooler

Where air cooling and de-humidifying is required, the Malley Water Cooler operates in conjunction with the air washer. Cooling is effected by brine circulation or by direct expansion coils in the cooler tank, and the tank is connected to the water system between the spray pump and spray nozzles to ensure maximum efficiency. The coils are covered with water and in a chamber entirely isolated from the ventilation system, obviating the risk of air contamination through leakage or breakdown.



Unit Filter.

### Air Filters

To meet the demand for an inexpensive air filter, we have undertaken the Australasian manufacturing rights of the "Lewis" viscous filter, which can be supplied in the Unit Manual cleansing type or alternatively in the Automatic continuous or intermittent self-cleansing types.

The Manual cleansing type of filter is made up of units or cells, each containing deflector plates, closely spaced and arranged to retain the viscous fluid used equally on all the surfaces presented to the air. The distribution of the air is uniform throughout, and cleansing of the units can be effected by removal, or alternately in position by means of the "Spray Gun."

The automatic continuous self-cleansing type of filter is built up in units to meet requirements; cleansing is effected by means of an electrically operated pump discharging the viscous fluid through nozzles travelling

over the filter area. The electric pump can be left in continuous operation or a time switch may be provided to start and stop the motor at required intervals.

### Fresh Air Heating System

To meet the demand for an economical heating system for warming workshops, halls, theatres, and large buildings, we have evolved the Malley Warm Air Circulator, to provide warmth by means of a simple coke fire without the use of pipes or radiators.

### Louvres and Dampers

For controlling and regulating air flow we manufacture louvres and dampers to meet every need. Where duct work is carried through partition walls, specify "Malley" multi-louvre damper arranged with counterweight and fusible link arranged to close in the event of a temperature inside or outside of duct exceeding 140 to 160 deg. F. Dampers to be of heavy gauge steel, hung on pivots mounted in substantial steel frame. Fusible link to be inside (outside) ductwork.

### Automatic Louvres

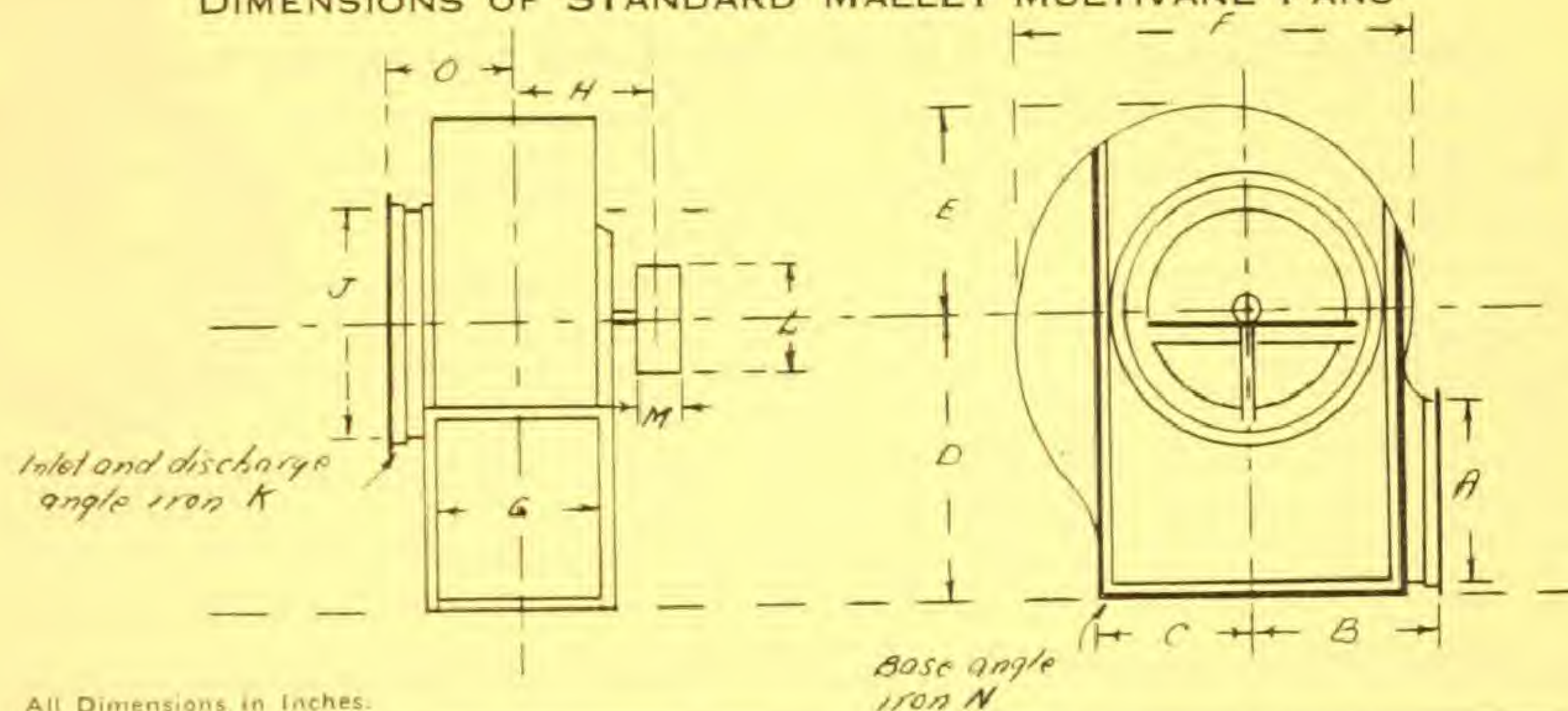
Where it is required to ensure that air passes through openings in one direction only, specify thus:

Provide in openings ..... in. x ..... in. Malley Automatic Self-closing Louvre. Blades shall be of aluminium mounted on steel pivots swinging in bronze bearings. All mounted in a frame to suit opening. Form openings with selected steel architraves and protect louvres with expanded metal or crimped wire mesh (if required).



Automatic Louvre.

### DIMENSIONS OF STANDARD MALLEY MULTIVANE FANS



All Dimensions in Inches.

Fan No.	A	B	C	D	E	F	G	H	I	K	L	M	N	O	Shaft Diam.
1	4 1/2	4 1/2	5 1/2	8 1/2	5 1/2	9 1/2	4	6 1/2	6	1 x 1/2	2 1/2	1 1/2	1 x 1/2	4 1/2	3/4
1 1/2	6 1/2	6 1/2	7	11 1/2	8 1/2	14 1/2	6	8 1/2	9	1 x 1/2	3 1/2	2 1/2	1 x 1/2	5 1/2	7/8
2	9	8 1/2	8 1/2	15	11 1/2	19 1/2	8	9 1/2	12	3 x 1/2	5	3	1 x 1/2	6 1/2	1
2 1/2	11 1/2	10 1/2	11	19 1/2	14 1/2	24 1/2	10	10 1/2	15	3 1/2 x 1/2	7	3	1 1/2 x 1/2	8 1/2	1 1/4
3	13 1/2	12 1/2	12 1/2	22 1/2	16 1/2	29 1/2	12	12 1/2	18	1 1/2 x 3/4	8	3 1/2	1 1/2 x 1/2	9 1/2	1 1/2
3 1/2	15 1/2	14 1/2	14	25 1/2	19 1/2	34 1/2	14	13 1/2	21	1 1/2 x 3/4	9	3 1/2	1 1/2 x 1/2	10 1/2	1 3/4
4	18	16 1/2	15 1/2	29	22 1/2	39	16	14 1/2	24	1 1/2 x 3/4	10	4	1 1/2 x 1/2	11 1/2	1 3/4
4 1/2	20 1/2	18 1/2	17 1/2	32 1/2	25 1/2	43 1/2	18	15 1/2	27	1 1/2 x 1	12	4 1/2	1 1/2 x 1	13 1/2	1 3/4
5	22 1/2	20	19 1/2	36 1/2	28 1/2	48 1/2	20	16 1/2	30	2 x 1/2	13	5	2 x 1/2	15 1/2	1 3/4
6	27	25	24 1/2	43	33 1/2	58 1/2	24	19 1/2	36	2 x 1/2	15	6	2 x 1/2	18 1/2	2
7	31 1/2	31 1/2	26	50 1/2	39 1/2	68 1/2	28	22 1/2	42	2 x 1/2	18	7	2 1/2 x 1/2	21 1/2	2 1/4
8	36	35 1/2	29	58 1/2	46 1/2	81	32	25 1/2	48	2 x 1/2	20	8	2 1/2 x 1/2	24 1/2	2 1/2
9	40 1/2	40	32 1/2	65 1/2	52 1/2	90 1/2	36	28 1/2	54	2 x 1/2	23	9	3 x 1/2	27 1/2	2 3/4
10	45	44	35 1/2	72 1/2	57 1/2	100 1/2	40	30 1/2	60	2 x 1/2	25	10	3 x 1/2	30 1/2	3
11	49 1/2	49	38 1/2	79 1/2	63 1/2	110 1/2	44	33 1/2	66	2 x 1/2	28	11	3 x 1/2	33 1/2	3 1/4
12	54	53	41 1/2	86 1/2	69	120 1/2	48	36 1/2	72	2 x 1/2	30	12	3 x 1/2	36 1/2	3 1/2

(Continued on next page)



## PERFORMANCE TABLE OF "ALL RED" MULTIVANE FANS

The following are calculated on velocities necessary to produce static water gauge, i.e., the pressure necessary to overcome the resistance in the air system to which the fan is applied. In comparing "All Red" Fans with fans of other makes, special care should be taken, as some manufacturers rate their fans on a total water gauge which is approximately

50 per cent. higher for a given output and B.H.P., and so misleading. Horse-powers shown in columns are, first, the nett B.H.P. necessary to move the given volume of air at the stated pressures, so when installing the prime mover, allowances must be made to cover drive losses. For double width fans, figures in tables below are doubled.

Water Gauge.	R.P.M.	C.F.M.	B.H.P.	R.P.M.	C.F.M.	B.H.P.	R.P.M.	C.F.M.	B.H.P.	R.P.M.	C.F.M.	B.H.P.
	FAN No. 1.			FAN No. 1½.			FAN No. 2.			FAN No. 2½.		
½	1,700	245	.033	1,174	575	.09	885	1,000	.16	705	1,540	.27
1	2,540	360	.098	1,685	850	.25	1,270	1,450	.48	1,010	2,265	.71
1½	3,115	430	.181	2,066	1,050	.48	1,560	1,780	.81	1,240	2,740	1.3
2	3,615	500	.31	2,398	1,200	.69	1,800	2,060	1.21	1,440	3,195	1.84
2½	4,000	550	.4	2,710	1,300	.98	2,000	2,240	1.7	1,600	3,460	2.5
3	4,384	600	.56	2,912	1,425	1.31	2,190	2,460	2.2	1,750	3,805	3.3
	FAN No. 3.			FAN No. 3½.			FAN No. 4.			FAN No. 4½.		
½	585	2,290	.37	500	3,000	.52	460	3,975	.8	350	6,000	.8
1	840	3,325	.98	720	4,350	1.3	630	5,780	1.7	505	8,975	2.3
1½	1,030	4,075	1.83	885	5,320	2.4	775	7,075	3.2	620	11,000	4.5
2	1,200	4,720	2.75	1,026	6,190	3.7	900	8,225	4.6	720	12,500	6.75
2½	1,330	5,120	3.61	1,135	6,710	4.81	995	8,940	6.4	795	13,750	9
3	1,450	5,625	4.81	1,245	7,390	6.5	1,090	9,830	8.5	870	15,000	12
	FAN No. 5.			FAN No. 6.			FAN No. 7.			FAN No. 8.		
½	290	8,750	1.25	250	9,700	1.36	230	11,000	2.32	195	20,300	2.9
1	420	11,000	3.3	360	15,300	5.01	315	20,500	5.6	280	27,100	7.6
1½	520	12,385	6.3	440	19,000	10.9	385	25,250	10.3	345	33,250	13.78
2	600	14,760	9.75	513	21,700	14.3	450	29,100	16.5	395	38,600	21.4
2½	660	16,000	11	567	24,000	16.5	495	31,800	22.5	440	42,100	29.4
3	720	18,250	15.1	622	26,500	22.5	545	35,200	29.25	485	46,150	38.25
	FAN No. 9.			FAN No. 10.			FAN No. 11.			FAN No. 12.		
½	175	23,500	3.18	160	28,500	4.16	140	32,250	4.5	143	45,500	6.25
1	255	34,250	9.6	230	42,500	11.4	210	46,775	12.81	205	64,300	18
1½	310	42,100	17.3	280	52,000	21.3	258	57,700	23.9	250	79,100	33
2	360	50,520	28.25	325	60,100	33.4	300	67,100	37.6	294	93,400	50
2½	400	53,000	37.3	360	65,750	46.3	330	73,000	51.25	323	99,300	67.5
3	440	58,500	49.15	395	72,500	60.2	363	80,000	67.6	352	108,900	83.2

## CAPACITY TABLES OF "MALLEY" STANDARD EXHAUSTER FANS

The capacity tables are calculated from tests carried out over the large number of fans constructed by us during the past 20 years. Two output values are shown for each fan, with speed and power characteristics for a wide range of resistances for our standard fans.

Each fan enquiry and order is specially investigated by our technical staff, and the fan blade curvature is varied to provide maximum efficiency at the specified conditions.

FAN.			1in. W.G.		2in. W.G.		3in. W.G.		4in. W.G.		5in. W.G.		6in. W.G.		8in. W.G.		10in. W.G.	
No.	Size Inlet Ins.	Output Cu. Ft. Per Min.	RPM.	BHP.	RPM.	BHP.	RPM.	BHP.	RPM.	BHP.	RPM.	BHP.	RPM.	BHP.	RPM.	BHP.	RPM.	BHP.
25	11	805 1,610	962	.25	1,278 1,506	.48 1.29	1,550 1,733	.79 1.68	1,768 1,910	1.04 2.01	2,078 2,42	2.42 2.90	2,248 2,562	2.90 3.87	2,828 3,37	4.87		
30	13	1,106 2,212	779	.34	1,023 1,205	.66 1.64	1,241 1,385	1.08 2.3	1,412 1,527	1.43 2.81	1,661 1,961	3.32 3.98	1,795 2,043	3.98 5.31	2,257 2,557	6.68		
35	15	1,498 2,995	668	.47	888 1,045	.90 2.22	1,077 1,203	1.46 3.12	1,227 1,327	1.94 3.80	1,444 1,644	4.50 5.40	1,560 1,776	5.40 7.18	1,963 2,257	9.05		
40	17	1,936 3,872	593	.61	787 926	1.16 2.87	954 1,065	1.89 4.03	1,080 1,176	2.50 4.90	1,278 1,478	5.81 6.97	1,383 1,573	6.97 9.30	1,738 1,963	11.7		
45	19	2,400 4,800	513	.75	682 803	1.44 3.55	827 922	2.34 5.00	942 1,018	3.11 6.08	1,107 1,278	7.20 8.64	1,196 1,363	8.64 11.5	1,506 1,738	14.5		
50	21	2,950 5,900	467	.92	618 728	1.77 4.37	752 839	2.88 6.13	856 925	3.82 7.48	1,007 1,107	8.85 10.6	1,087 1,237	10.6 14.2	1,367 1,567	17.8		
55	23	3,538 7,075	427	1.10	567 668	2.12 5.23	688 769	3.39 7.35	785 848	4.58 8.98	923 1,066	10.6 12.7	988 1,136	12.7 17.0	1,255 1,455	21.3		
60	25	4,188 8,376	385	1.30	511 602	2.51 6.18	618 692	4.08 8.70	706 763	5.42 10.6	829 923	12.6 15.1	898 1,020	15.1 20.3	1,127 1,277	25.3		
70	29	5,625 11,250	335	1.75	443 523	3.37 8.32	538 603	5.50 11.7	614 665	7.28 14.3	723 823	16.8 20.3	781 888	20.3 27.0	983 1,127	34.0		
80	33	7,275 14,550	296	2.27	393 463	4.36 10.8	477 533	7.10 15.1	543 588	9.43 18.4	638 723	21.8 26.6	691 798	26.2 32.0	883 1,027	42.8		
90	37	8,880 17,776	257	2.77	340 402	5.33 13.3	413 462	8.66 18.5	472 508	11.5 22.5	564 638	26.6 32.0	598 680	32.0 42.6	680 783	53.6		
100	41	11,250 22,500	233	3.50	310 365	6.75 16.6	375 419	11.0 23.4	428 462	14.6 28.5	503 563	33.8 40.5	543 618	40.5 54.0	618 683	67.9		



## MALLEY PLANING MILL OR EXHAUSTER FANS

## DIMENSIONS OF SINGLE FANS.

Number of Fan.	Diameter Round Pipe to Fit over Inlet and Outlet. Inches.	Diameter of Wheel. Inches.	Pulley.		Diameter of Shaft. Inches.	Extreme Dimensions for Bottom Horizontal Discharge Fans.			Weight of Standard Fan in Pounds.
			Diameter. Inches.	Face. Inches.		Length. Inches.	Width. Inches.	Height. Inches.	
25	11	16	5	4½	1½	25½	21½	27½	265
30	13	20	6	5½	1½	30½	26½	32½	390
35	15	23	7	6½	1½	34½	31½	37	480
40	17	26	8	7½	1½	39½	36½	41½	685
45	19	30	9	8½	1½	43½	41½	46½	900
50	21	33	10	9½	1½	48½	46½	51	1,050
55	23	36	11	10½	2½	52½	51½	56	1,350
60	25	40	12	11½	2½	57½	56½	61	1,800
70	28	46	14	12½	2½	66½	64½	70½	2,600
80	32	53	16	14½	2½	75	73½	79½	3,415
90	37	60	18	16½	3½	83½	81½	87	4,450
100	41	66	20	18½	3½	92½	90½	97½	6,250

## "MALLEY" PROPELLOR FANS

Supplied to meet all conditions, direct-coupled to motors, fitted with belt pulleys or arranged for gear or silent chain

drive, may be fitted with bedplate or ring with wall brackets to suit local conditions.

## "MALLEY" DIRECT CONNECTED PROPELLOR FAN

Economical of power. Where conditions permit of a choice between a propellor type and a volumetric type of fan, the following rules are useful:—

- 1.—For open ventilation use "Malley" Propellor Fans.
- 2.—Make the air duct the same diameter as fan or larger, avoiding obstructions or acute angle bends.
- 3.—When sharp bends and small ducts are unavoidable, use "Malley" Volumetric fans.
- 4.—Use large fans at low speeds and save power.



Silent V-Belt Driven Propellor Fan.

## APPROXIMATE CAPACITIES OF "MALLEY" PROPELLOR FANS

Diameter of Blades. Inches.	For Quiet Running.			For Industrial Ventilation.		
	R.P.M.	H.P.	Cubic Feet Per Minute.	R.P.M.	H.P.	Cubic Feet Per Minute.
12	900	From .02 to .05	From 500 to 1,000	1,500	From .05 to .2	From 800 to 1,850
18	700	.03 to .1	1,075 to 2,150	1,500	.2 to .51	2,100 to 4,250
24	650	.1 to .4	2,100 to 5,700	1,400	.25 to .9	5,500 to 11,000
30	500	.2 to .75	4,600 to 9,200	900	.4 to 2.5	8,500 to 13,000
36	500	.25 to .8	6,000 to 12,000	750	.75 to 2.6	9,000 to 18,000
42	400	.4 to 1.5	10,000 to 20,750	650	1.5 to 4.0	16,000 to 32,000

## MALLEY'S NARROW WIDTH EXHAUST FANS AND NARROW PRESSURE FANS

Malley's narrow-width Exhaust Fans and Narrow Pressure Fans have been designed to meet the demand for small capacity heavy duty Fans.

The Casings and Runners are solidly built of steel and special care is taken in balancing the Runners. Spindles are mounted on ball bearings.

## MALLEY'S NARROW WIDTH EXHAUST FANS

## DIMENSIONS.

No.	Inlet Dia. Inches.	Outlet. Inches.	Pulley.		Shaft Diameter Inches.
			Diameter Inches.	Face Inches.	
5	5	4½ Square	5	3	1/2
6	6	5½ Square	6	4	3/4
7	7	6½ Square	7	5	1
8	8	7½ Square	8	6	1 1/4
9	9	8½ Square	9	7	1 1/2

(Continued on next page.)



### MALLEY'S NARROW WIDTH EXHAUST FANS

#### CAPACITY TABLE

No.	½-ounce (.87 inches)			1-ounce (1.74 inches)			2-ounce (3.5 inches)		
	R.P.M.	Capacity Cu Ft. Per Min.	H.P.	R.P.M.	Capacity Cu Ft. Per Min.	H.P.	R.P.M.	Capacity Cu Ft. Per Min.	H.P.
5	1,650	104	.024	2,386	149	.074	3,390	209	.223
6	1,400	260	.059	1,972	371	.187	2,803	530	.591
7	960	430	.090	1,381	619	.309	1,962	887	.982
8	853	575	.125	1,214	820	.412	1,728	1,171	1.300
9	772	830	.173	1,087	1,182	.593	1,551	1,687	1.871

No.	3-ounce (5.2 inches)			4-ounce (6.9 inches)			6-ounce (10.4 inches)		
	R.P.M.	Capacity Cu Ft. Per Min.	H.P.	R.P.M.	Capacity Cu Ft. Per Min.	H.P.	R.P.M.	Capacity Cu Ft. Per Min.	H.P.
5	4,159	257	.381	—	—	—	—	—	—
6	3,437	650	.962	3,971	750	1.37	—	—	—
7	2,415	1,099	1.613	2,790	1,260	2.30	3,430	1,549	3.85
8	2,114	1,439	2.132	2,450	1,663	3.02	3,013	2,050	5.11
9	1,910	2,069	3.07	2,211	2,391	4.26	2,719	2,942	7.36

### MALLEY'S NARROW PRESSURE FANS

#### TABLE OF OUTPUTS

Diameter of Fan.	20-inch.			25-inch.			30-inch.		
	Volume, C.F.M.	R.P.M.	B.H.P.	Volume, C.F.M.	R.P.M.	B.H.P.	Volume, C.F.M.	R.P.M.	B.H.P.
6	250	1,580	0.66	450	1,265	1.2	1,000	1,055	2.65
8	290	1,830	1	510	1,460	1.8	1,160	1,220	4
10	325	2,040	1.4	570	1,630	2.5	1,300	1,360	5.65
12	355	2,240	1.9	630	1,750	3.3	1,420	1,490	7.5
14	380	2,415	2.4	680	1,930	4.2	1,530	1,619	9.6
16	410	2,580	2.9	730	2,065	5.2	1,640	1,720	11.5
18	435	2,740	3.5	770	2,190	6.3	1,740	1,825	14
20	460	2,890	4	810	2,310	7.2	1,830	1,925	16
22	480	3,030	4.65	850	2,425	8.5	1,920	2,020	18.5
24	500	3,165	5.25	890	2,530	9.5	2,000	2,110	21
26	520	3,300	6	930	2,635	10.5	2,090	2,195	24
28	540	3,420	6.8	970	2,740	12	2,170	2,280	27
30	560	3,540	7.5	1,000	2,830	13	2,240	2,360	30

Size, Inches.	Dimensions.		Pulley.	
	Inlet.	Outlet, Inches.	Diameter, Inches.	Width, Inches.
20	1ft. 4in.	3 x 2½	4½	3
25	1ft. 9in.	4 x 3	5½	5
30	2ft. 1in.	6 x 5	6½	6

### THE MALLEY UNIT VISCOUS FILTER

#### Standard Characteristics

Size of cell, 20 in. x 20 in. x 3½ in. Air capacity per cell, 1000 to 2000 cubic feet per minute. Resistance through filter, .25 to .38 in. water gauge.

#### Service

Our technical staff are available to furnish proposals for any capacity of filter, and filters to suit customers' openings will be made at short notice.

The lower capacities given are for continuous rating operation, while the higher capacities are suitable for intermittent operation. These filters are also made in air brick sizes and in suitable units for air compressor and oil engine uses.

#### Sizes and Capacities

No. of Units.	Size, Inches.	Capacity, C.F.M.
1	20 x 20	1,000 to 2,000
2	20 x 40	2,000 to 4,000
3	20 x 60	3,000 to 6,000
4	40 x 40	4,000 to 8,000
5	20 x 100	5,000 to 10,000
6	40 x 60	6,000 to 12,000
8	40 x 80	8,000 to 16,000
10	40 x 100	10,000 to 20,000



## MALLEY AIR WASHERS

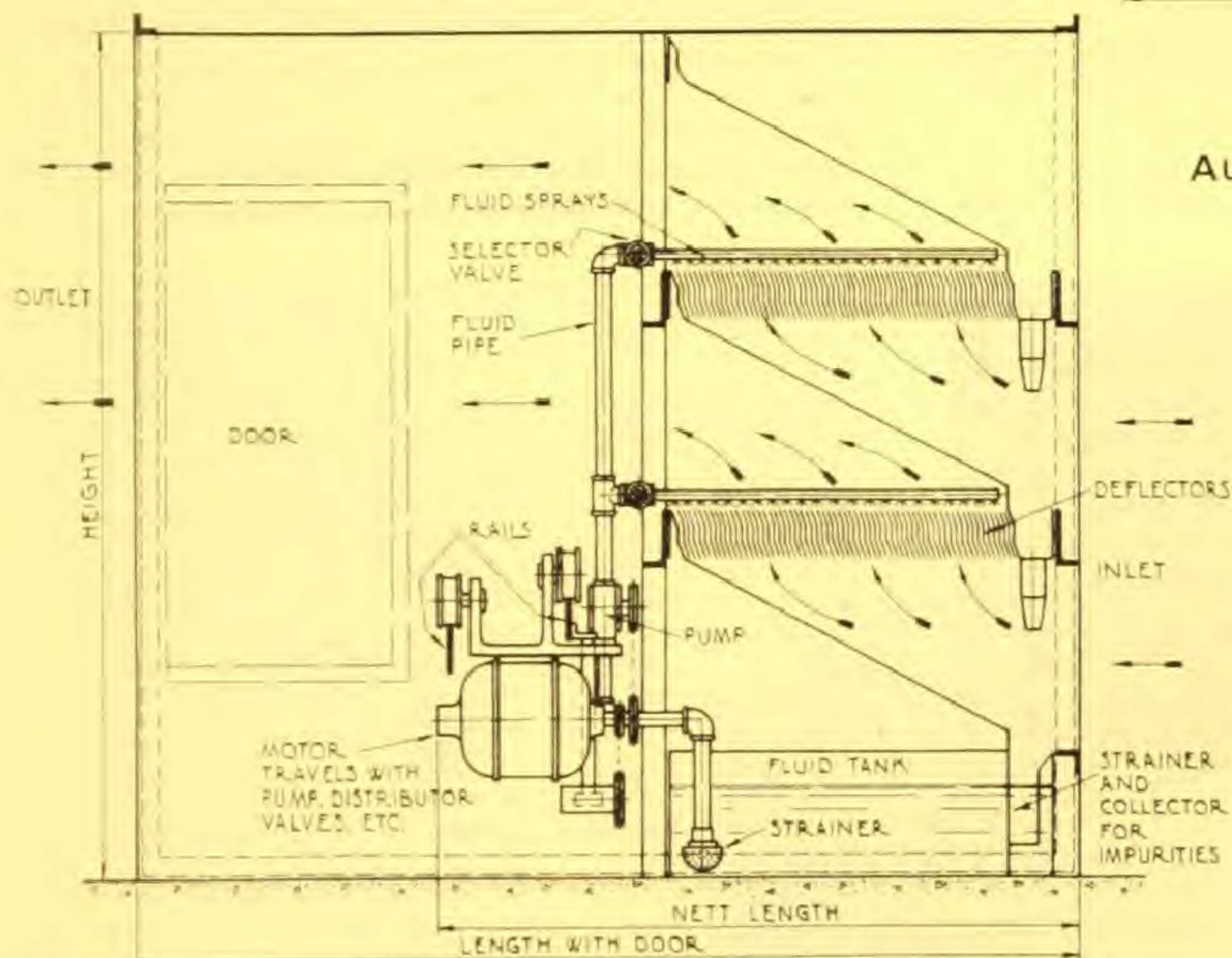
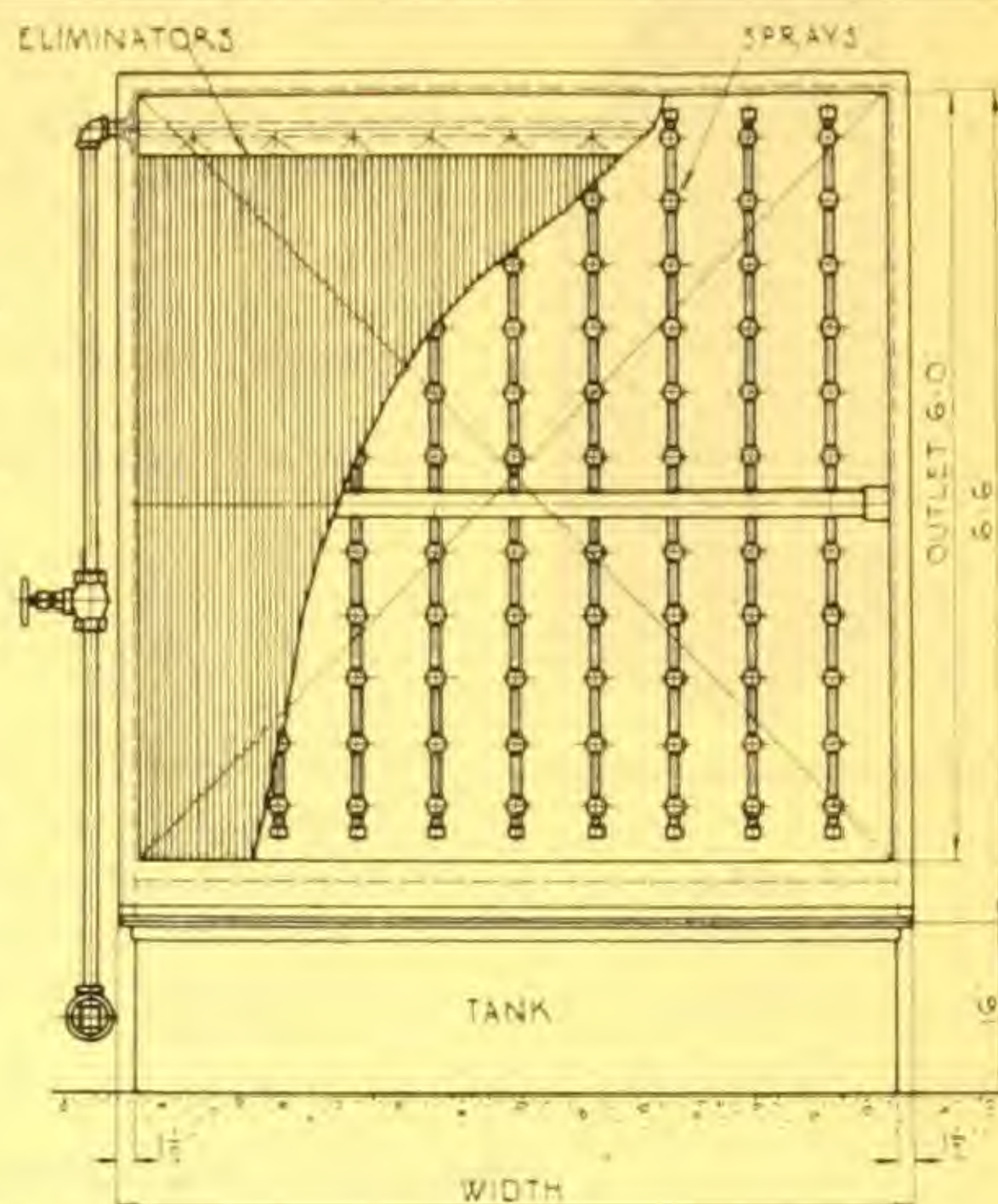
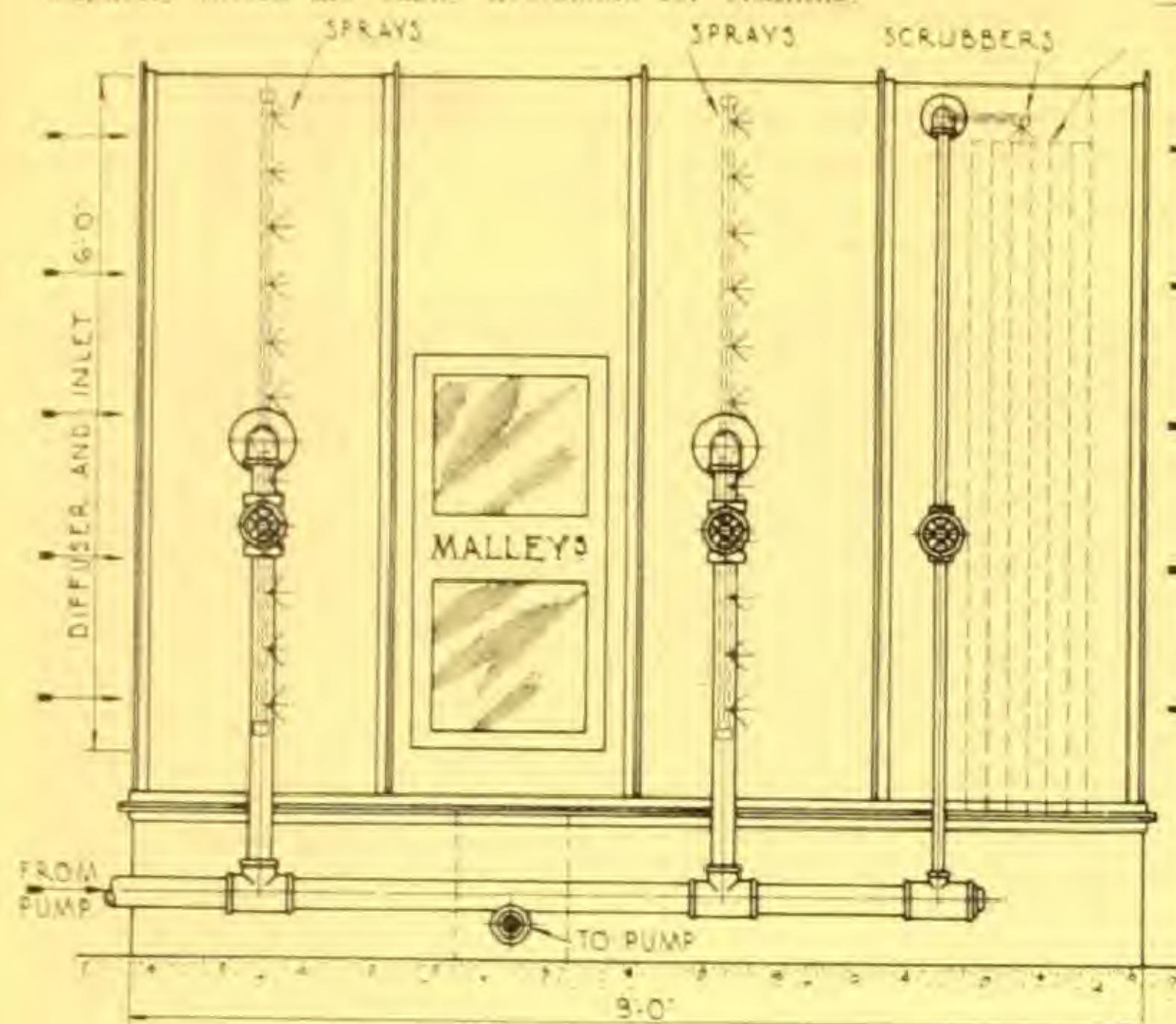
## DESCRIPTION

Principally used for filtration in connection with ventilation systems or for air washing in plenum heating and ventilating plants.

They are highly efficient and maintain good results continuously, extracting practically the whole of the mechanical impurities of the air passing through them. The atomising sprays are of the "vortex" non-clogging type, and the large capacity filters are easily accessible for cleaning.

## CAPACITIES AND WIDTHS

No.	Capacity, Cu. Ft. Min.	Width.	Gallons Per Min.	Pump Inches.
10	10,000	2ft. 9in.	140	2½
20	20,000	5ft. 3in.	240	3
30	30,000	7ft. 9in.	330	4
40	40,000	10ft. 3in.	430	5
50	50,000	12ft. 9in.	500	6

AUTOMATIC SELF-CLEANING  
AIR FILTER

Removes dust, does not increase humidity, cleanses continuously or at regular intervals.

Deflectors divide the air into narrow streams, each bend causes the dust and impurities in the moving air to be carried by centrifugal force to the side of stream, contacting with the adhesive coated surface which retains the dust.

The dust-coated surfaces are sluiced down at regular periods; the viscous liquid carries the dust and impurities to strainer; viscous liquid passes through strainer screen to tank for reuse.

## CAPACITIES AND DIMENSIONS

No.	Cubic Ft. Per Min.	Height.	Width.	Length.	
				Net.	With Door.
6	6,000	4ft. 6in.	3ft. 9in.	3ft. 6in.	5ft. 0in.
12	12,000	4ft. 6in.	7ft. 6in.	3ft. 6in.	5ft. 0in.
18	18,000	5ft. 9in.	7ft. 6in.	3ft. 6in.	5ft. 0in.
24	24,000	7ft. 0in.	7ft. 6in.	3ft. 6in.	5ft. 0in.

(Continued on next page)



## MALLEY'S FRESH AIR HEATING SYSTEM

Is adaptable to large and small residences, Workshops, Churches, Cinema Houses and Theatres and many other types of buildings. The Malley Heater consists of a low temperature furnace arranged for coke firing, combined with a Warm Air Circulator and comprises a Central Heating Unit complete without radiators, pipes or mechanical means. It can be placed externally, in which case



Malley's Peerless Heater.

**Lowest  
Installation  
Costs**

the warm air is conveyed by a duct to where it is required.

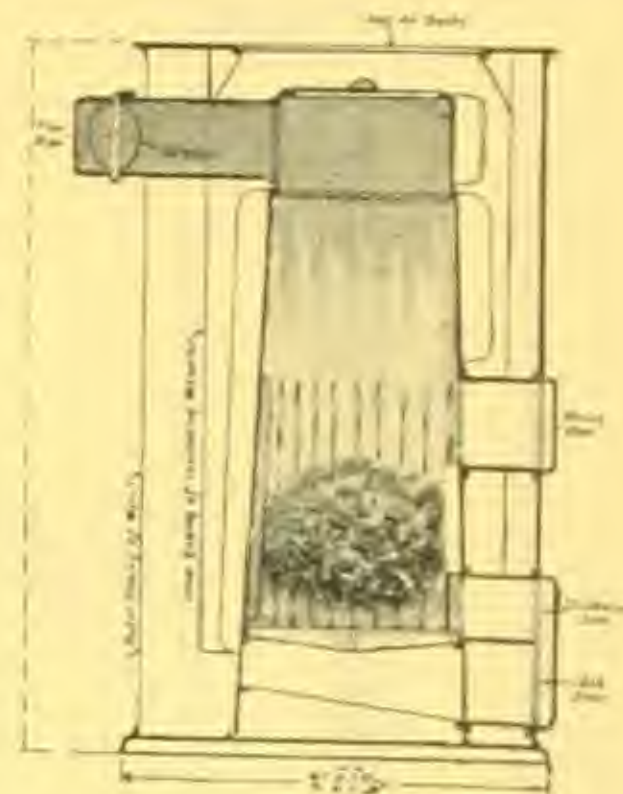
When centrally placed, the heater will warm a room or building without pipes or radiators.

The Air Heating Chambers are quite distinct and independent of the furnace and waste flue, and it is impossible for the air and products of combustion to intermix.

## SIZES AND CAPACITIES

Type.	Dimensions.			Suitable for Heating. Gross Cu. Ft.
	Height.	Breadth.	Depth.	
A	3ft. 9in.	1ft. 8in.	1ft. 8in.	30,000
B	4ft. 6in.	2ft. 4in.	2ft. 8in.	45,000
C	5ft. 9in.	2ft. 6in.	3ft. 0in.	100,000
D	6ft. 6in.	3ft. 0in.	3ft. 9in.	200,000

- A: Domestic Type, Residences, Offices, etc.  
 B: Suitable for Large Residences, Parish Rooms, etc.  
 C: Suitable for Churches, Town Halls, Cinemas.  
 D: Industrial Type for Warehouses, Workshops and Large Buildings.



ARRANGEMENT OF HEATER.

**Lowest  
Operation  
Costs**

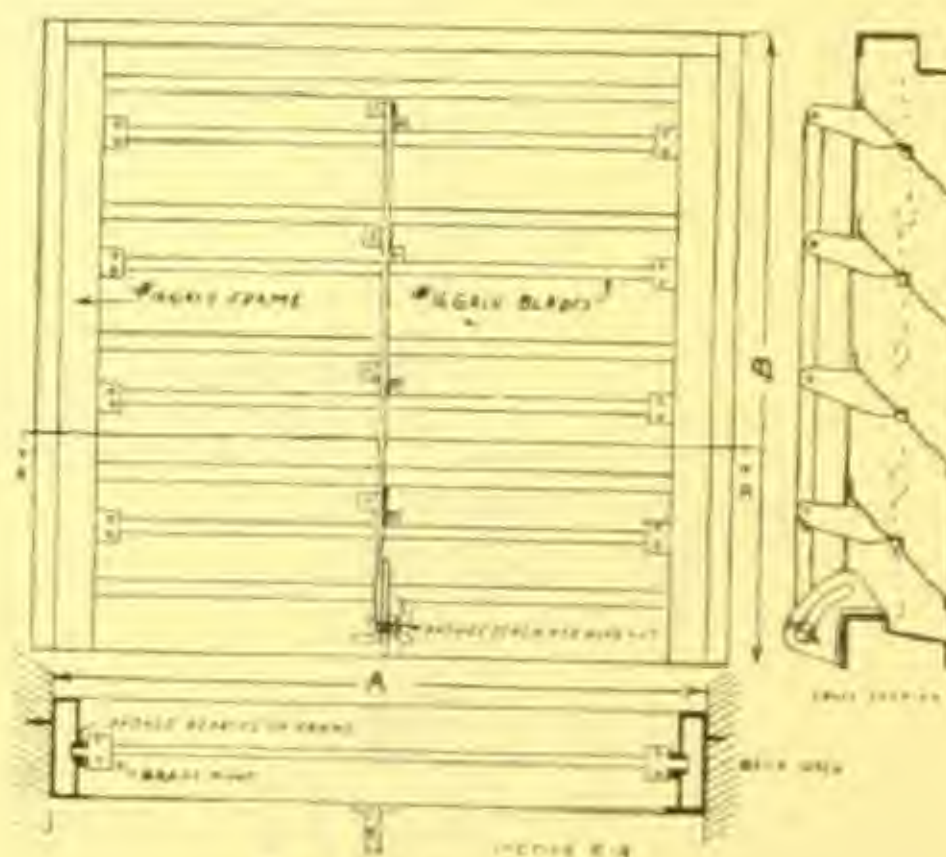
## MALLEY'S AUTOMATIC OR ADJUSTABLE LOUVRES

These high-grade Louvres are installed to ensure adequate fresh air supply in connection with any heating and ventilating system, in schools, power plants, public buildings, transformer vaults, etc.

## Advantages

Easy to operate, absolutely foolproof. Practically inde-

structable, absolutely stormproof and weatherproof. Blades do not protrude when Louvre is open. Can be installed in series of two or more units to fit any size opening. Blades can be removed entirely in case of emergency. Furnished with bird wire if required. Reasonably priced, considering the high-grade material and workmanship.



Construction Features

Malley's Louvres—Operated by Hand Lever.

## OTHER MALLEY PRODUCTS

Awning Clips  
 Awning Hooks  
 Baffles for Gas Heaters  
 Bath Heaters (Gas)  
 Bath Heaters (Gas Storage)  
 Bath Heaters (Chip)  
 Bath Screens  
 Baths (Gal. Iron)  
 Bends  
 Boilers  
 Canopies

Cisterns (Galvanised)  
 Copper Flush Valve (Tanks)  
 Copper Boilers (Gas and Fuel)  
 Copper Workers  
 Downpipe (Round) (Square)  
 Pipe (Vent)  
 Fittings (Sanitary)  
 Fluming  
 Flush Pipes  
 Garbage Bins  
 Gravity Chutes

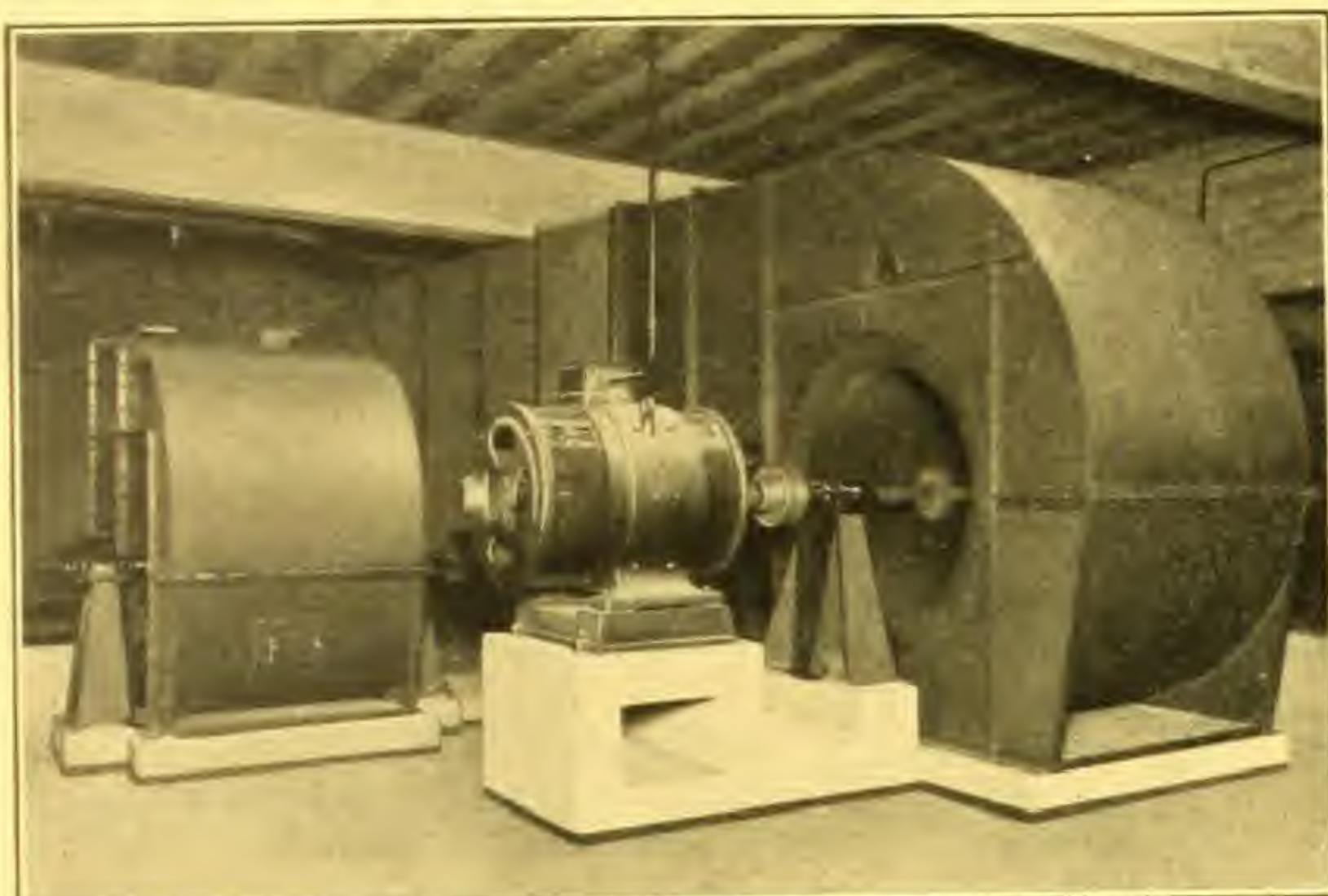
Guttering, Ridging and Valley  
 Ridge Roll  
 H Vents  
 Heads (Rainwater)  
 Hoppers  
 Light Elevators (Power or Hand)  
 Metal Stampers and Metal Spinners

Monel Metal Fittings, Utensils, etc.  
 Sanitary Combinations  
 Sanitary Pans  
 Sheet Metal Trucks  
 Tanks (Corrugated)  
 Troughing  
 Washing Tubs  
 Waste Paper Receptacles



FANS AND ALLIED EQUIPMENT	<b>D. RICHARDSON &amp; SONS</b> PTY. LTD. WHITEHALL ST., FOOTSCRAY, VIC. MANUFACTURERS.	<b>CROSSLE &amp; DUFF</b> PTY. LTD. COLLINS HOUSE, MELBOURNE, C.I. SALES REPRESENTATIVES.	
	Agents: Crossle & Duff Bros. Ltd., 52 Bridge Street, Sydney. Engineering Supply Co. of Australia Ltd., Edward & Charlotte Streets, Brisbane. Cory-Wright & Salmon, Wellington, New Zealand.		
	Frank De Rose & Co., 78 Waymouth Street, Adelaide. Atkins (W.A.) Ltd., 894 Hay Street, Perth.		30d  S.A.A. File No.

The above organisation has been created for the manufacture and sale of a complete line of fan machinery and associated appliances, particulars of which are now submitted



Main Ventilating Fans and Air Heaters for Plaza and Regent Theatres, Melbourne. Architects: C. H. Ballantyne.

Representative list of Ventilating and Heating Installations in which Richardson Fans and associated equipment have been used:—

The Melbourne Town Hall.  
The Williamstown Town Hall.  
The Malvern Town Hall.  
The Caulfield Town Hall.  
The Merri Theatre.  
The Comedy Theatre.  
Messrs. G. J. Coles & Co., Melbourne.  
T. & G. Building, Melbourne.  
National Bank Building, Melbourne.  
National Bank Building, Brisbane.  
Children's Hospital, Melbourne.  
Melbourne Hospital.  
The Capitol Theatre.  
The Palais Theatre.  
The Victory Theatre.  
The Regent Theatre, Melbourne.  
The Regent Theatre, Fitzroy.  
The Regent Theatre, Ballarat.  
The Regent Theatre, South Yarra.  
A.M.P., Melbourne.  
Eye and Ear Hospital, Melbourne.  
Alfred Hospital, Melbourne.  
Epworth Hospital, Melbourne.  
Queen Victoria Hospital, Melbourne.

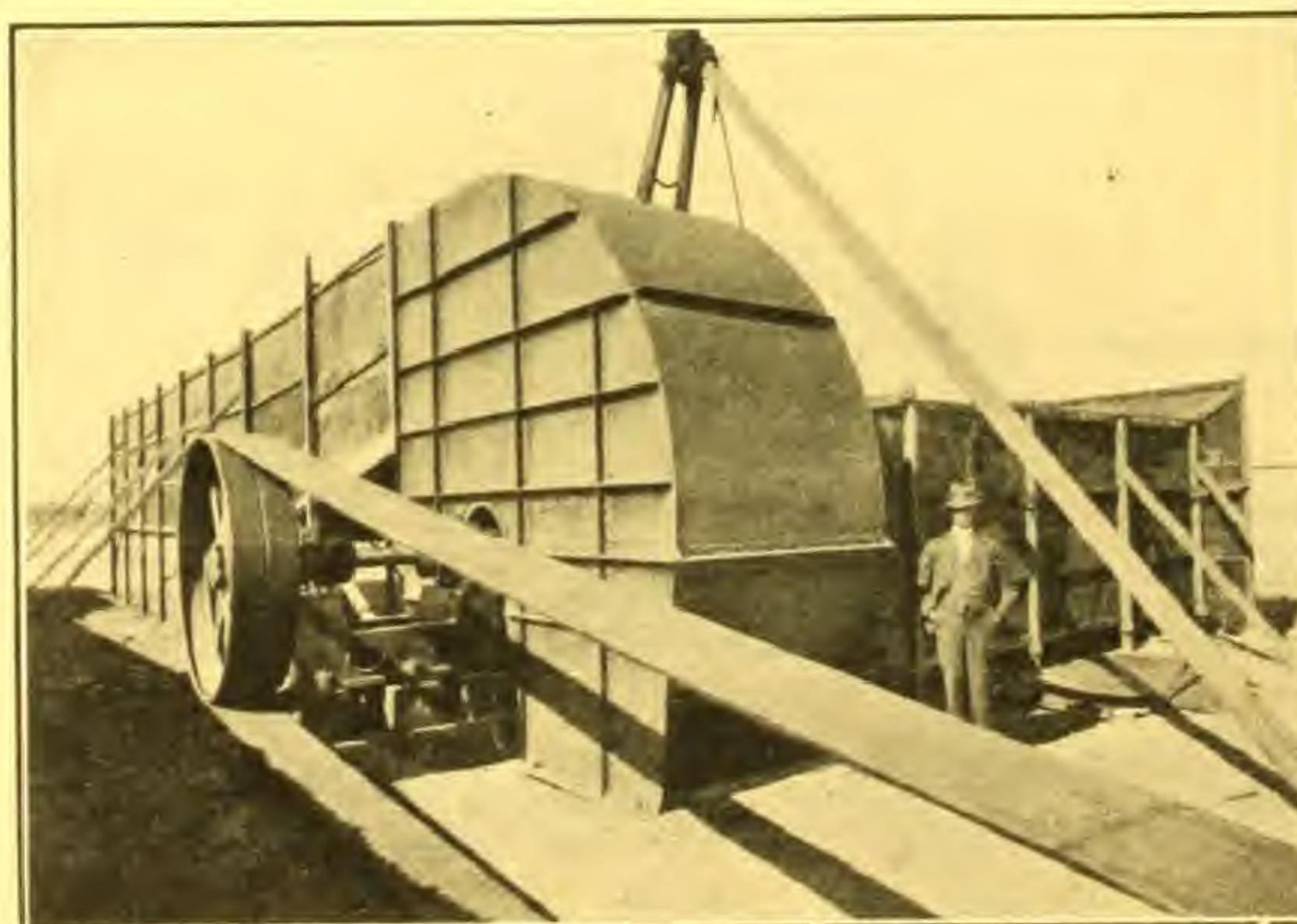
Partial list of Industrial application:—

The State Electricity Commission—Induced and Forced Draft Fans for Boiler Plant.  
Holden's Motor Body Builders—Ventilating and Heating Fans.  
Australian Glass Manufacturers—Cooling Fans.  
General Motors (Aust.) Pty. Ltd.—Ventilating Fans.  
MacRobertson's—Cooling and Ventilating Fans.  
Commonwealth Government—Automatic Telephone Exchanges and various applications.

in this journal for the use of Architects and Engineers, in the hope that the information as put forward may not only enable them to select apparatus suitable for their purpose, but that the data given may be of some service in solving the problems with which they have to contend.

The Richardson line has been wholly designed and manufactured in Australia, and continual progress is made in the development of new material so that the range of appliances available to clients shall be as up to date as possible.

A list of some of the more important installations in which Richardson Fans and associated equipment has been installed is of interest to show the extensive progress that has been made in Australia in this important branch of Engineering as associated with modern building construction.



Induced Draft Fan for Victorian Electricity Commission Undergoing Test.

Typical of large installations using Richardson Fans.

(Continued on next page)



## CHART FOR THE STUDY AND SELECTION OF HEATING.

CLASSIFICATION	TYPE OF APPLIANCE OR SYSTEM		SEE SKETCH No.	PRINCIPLE
HEATING (Distribution Only)	Open or Protected Fires			Direct Radiation
	Radiators (Central Generation)	Pipe and Pipe Coils		Direct Radiation
		Cast Iron (Open)		Direct Radiation
		Cast Iron (Recessed or Baffled)		Convection Currents
		Non-Ferrie (Cabinet) Non-Ferrie (Recessed) (See also page 361)	1 2	Convection Currents
	Unit Heaters (Local Generation)	Suspended (See also page 360)	3 & 8	Directed Air Flow
		On the Floor (See also page 356)	4	Directed Air Flow
	Hot Blast (duct system) (See also pages 354 and 359)		5	Directed Air Flow
VENTILATION	Combined Systems		1, 2 & 5	Directed Air Flow and Direct Radiation
	Natural	Gravity Systems		Pressure difference, i.e., temperature difference between indoors and outdoors
		(a) Windows; (b) Roof Ventilation	(b) 6	(b) Air pressure difference, depending on infiltration of air from inlet openings
	Mechanical (See also page 354 et seq.)	Extraction Only	7	(1) Propeller Fans (2) Centrifugal Fans
		Inlet Only (Plenum System)	5	Centrifugal Fans
		Combined Extraction and Inlet	9	All types of Fans



# VENTILATING AND AIR CONDITIONING APPLIANCES

351

CROSSLIE & DUFF  
PTY. LTD.

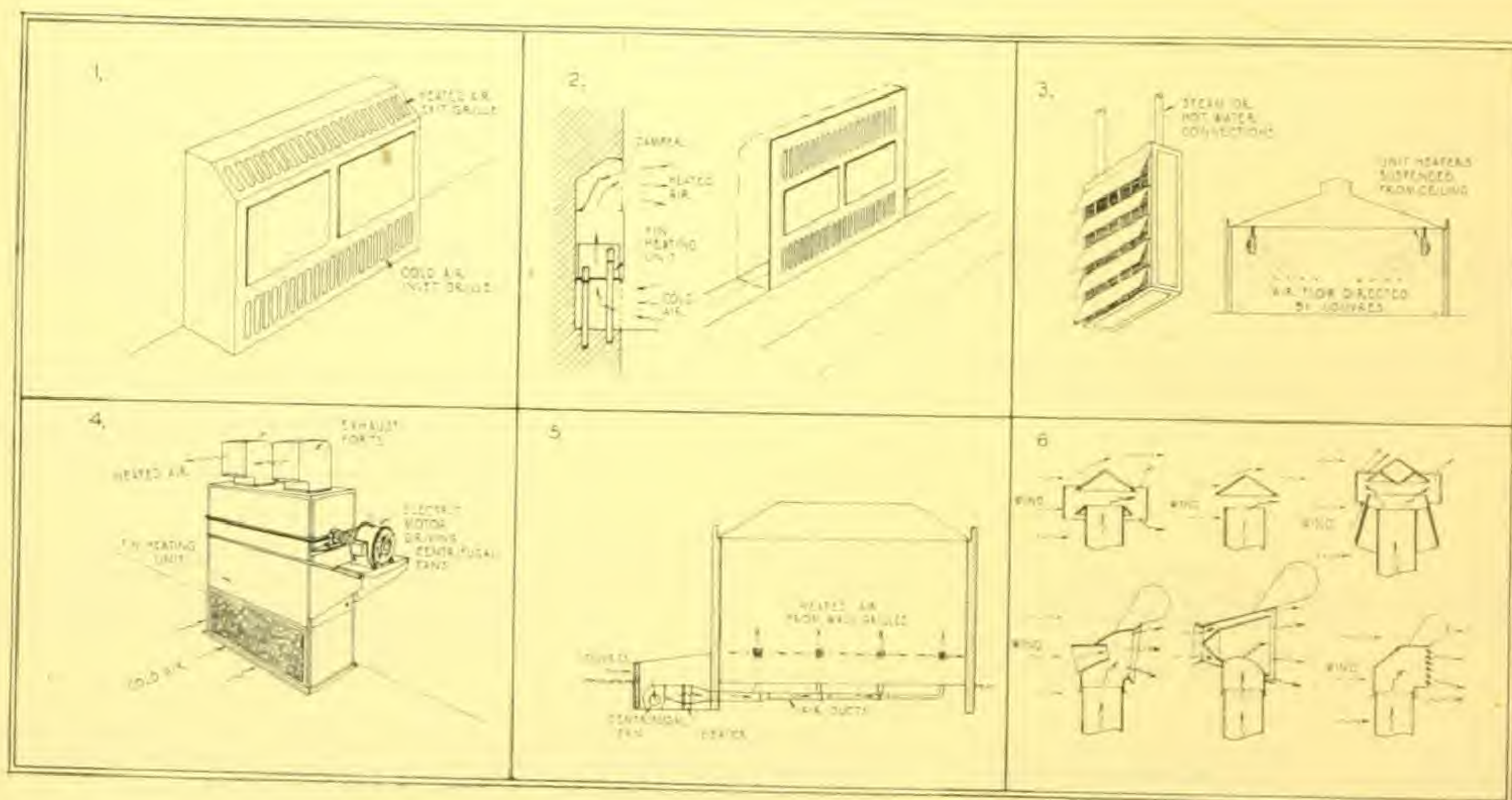
MEDIUM.	TYPES OF BUILDING USED IN.	SUITABLE LOCATION OF UNIT.	REMARKS.
Gas, Electricity, or Solid Fuel	Residences or where psychological effect is desired	Recessed fireplaces	Not an economical unit for continuous heating
Steam or Hot Water	Greenhouses, domestic garages, drying rooms	On walls and, in certain cases, on ceilings	Not as efficient as radiators. Appearance unsightly.
Steam or Hot Water	Residences	On floors, close to walls	Difficult to keep clean—the only available type of radiator in the past
Steam or Hot Water	Residences, offices, hotels, clubs	In walls or close to walls, with baffle plates fixed at top	More efficient than C.I. radiators in the open
Steam or Hot Water	Residences, offices, hotels, clubs	Cabinet—on floor close to walls—preferably below windows or at side of other openings. Recessed—in wall recess	The most economical form of radiation—greater efficiency of heating elements—less piping—simple control of heat in volume and direction
Pressure Steam, Exhaust Steam, or Hot Water	Factories, garages, work-rooms, small buildings	Suspended from roof trusses and ceilings, or at walls 10ft. to 14ft. above floor level. Placed where heat is desired, located like a lighting point	Being out of the way, more working space is available—simplicity of manual control or automatic control
Pressure Steam, Exhaust Steam, or Hot Water	Factories, garages, work-rooms, large buildings	May be placed anywhere on the floor	Greater volume of heated air supplied per machine than by unit heater. Air flow directed by simple adjustment of exhaust ports
Steam or Hot Water	Theatres, offices, libraries	Fan and heater in a separate housing or compartment away from area to be heated—generally adjacent to source of medium	Simplest and quietest form of heating large compartments from more or less concealed sources, i.e., grilles in walls and floors
Steam or Hot Water	Theatres, offices, libraries	Same as above. Direct radiation may be by open or convection radiators	Used in large compartments when certain obstructions may break up part of a directed air flow from grilles
Natural Air Flow	Seldom used in modern commercial buildings		By the use of chimneys or special built-in vent flues the necessary pressure is obtained—no definite control can be obtained
Natural Air Flow	(a) Residences (windows) (b) Factories (roof ventilators)	(b) Highest practical part of roof	(b) The principle of operation of roof ventilators depends on such a construction of the cowl as to cause the wind to induce a suction in the vicinity of the cowl. When the wind ceases the system becomes practically in-operative
Forced or Controlled Air Flow	In buildings where a natural ventilating system should be improved. Also in kitchens, small dining-rooms, laundries, etc.	In ceilings—on roof pent houses	(1) Propeller fans have many wide applications—can be successfully installed to improve any system of natural ventilation (2) Centrifugal fans only used where ducts are necessary
Forced or Controlled Air Flow	Very seldom used without mechanical exhausting appliances. Used in summer to carry cooled air into large compartments, as theatres, etc.	In separate fan room, as convenient as possible to the points of entry for the air	This system possesses the advantage that a definite air movement can be created over the area being ventilated
Forced or Controlled Air Flow	In all types of modern buildings	In separate fan rooms—as in basement or on roof	Complete control of ventilation under any conditions is obtained by this system. If desired, a reverse flow of air in compartments can be provided

(Continued on next page)



## CHART FOR THE STUDY AND SELECTION OF HEATING.

CLASSIFICATION.	TYPE OF APPLIANCE OR SYSTEM.	SEE SKETCH No.	PRINCIPLE.
COMBINED HEATING AND VENTILATING	Unit Heaters or Heat Diffusing Units (See pages 356 and 360)	3, 4 or 8	Directed air flows and temperature differences
	Hot Blast Plenum and Exhaust (See page 359)	9	Completely controlled heated air flow
	Radiators and Exhaust	1, 2 & 7	Direct Radiation and Air Circulation
AIR CONDITIONING	Air Cleaners (See page 357)	10 & 12	Air-borne impurities eliminated by contact with some medium
	Self-contained Humidifying and Air-Conditioning Units	11	Dust removed by air washing, and temperature and humidity under control at all times
	Complete installation	9 & 12	A combination of air-washer or filter, humidifier, heating units, etc.

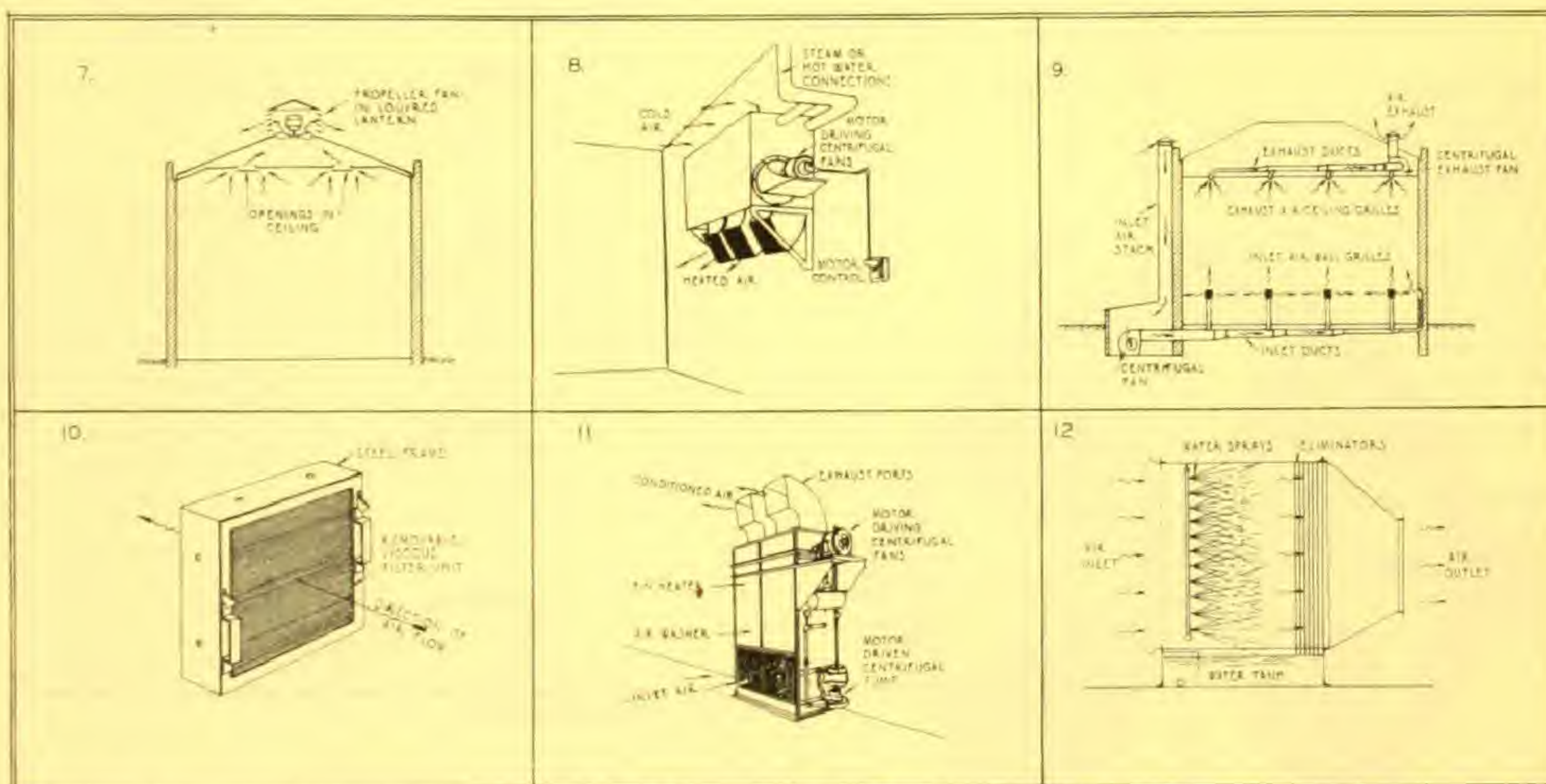




## VENTILATING AND AIR CONDITIONING APPLIANCES (Continued)

CROSSE & DUFF  
PTY. LTD.

MEDIUM	TYPES OF BUILDING USED IN.	SUITABLE LOCATION OF UNIT.	REMARKS.
Exhaust or Pressure Steam, Hot Water	Factories, garages, assembly rooms	Suspension from wall or ceiling Also available for setting up on floor	Economical system of heating large open areas. Use suspended type for rooms of ordinary height, or where men move about. Use floor type in rooms of high ceiling or where men work at set positions
Exhaust or Pressure Steam, Hot Water (air flow, by ducts)	Theatres, hotels, churches, banks, libraries, offices, halls	In well-planned fan rooms	The most efficient and economical way of heating and ventilating any type of modern building
Exhaust, either by Propeller or Centrifugal Fans	Theatres and churches	The fans in suitable location and the heating surface around walls and adjacent to the air inlets	This system can be used with advantage when it is desirable to heat the building when empty before the entry of the audience or congregation, the fan only being used when necessary for ventilation
Viscous Filters (see page 357) Air Washers	Used wherever a clean supply of air is required	In advance of unit fans—necessitating all air to pass through the filters	Essential to good ventilation
Continuous wetted surfaces washes air Fin coils used for reheating	In factories, etc., where clean air with uniform temperature and humidity is necessary	On floor or in separate room adjacent to the area being dealt with This form of unit is the economical solution of the automatic control of temperature and humidity in factories, etc.	A unit heater that washes and humidifies
See above	Where complete and perfect air conditioning under any external conditions is desirable	In combination with Centrifugal Fans	Complete, either manual or automatic control of the temperature, humidity, motion and cleanliness of the air within an enclosure

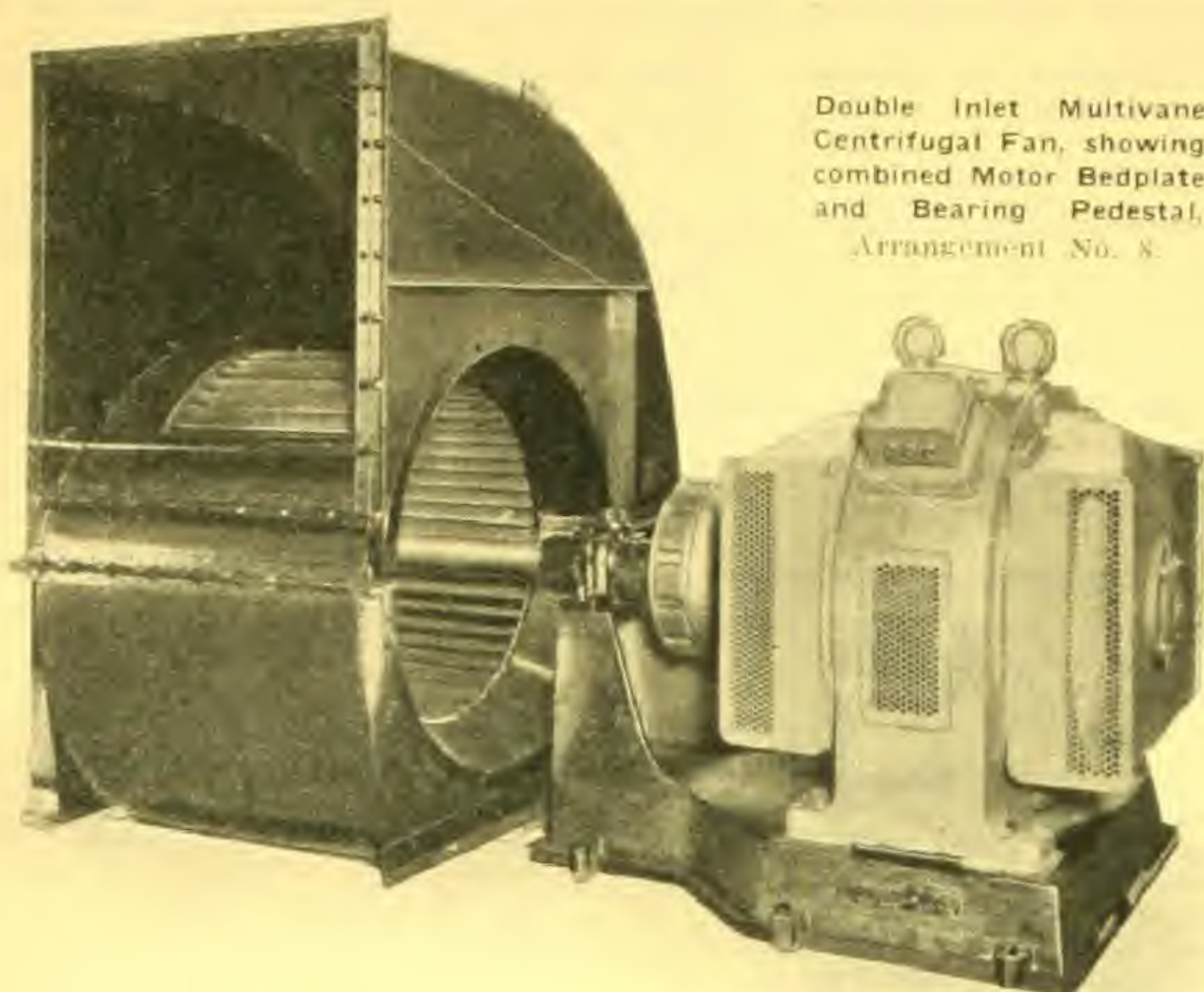


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RAMSAY'S CATALOGUE



## STANDARD MULTIVANE CENTRIFUGAL FANS



Double Inlet Multivane Centrifugal Fan, showing combined Motor Bedplate and Bearing Pedestal, Arrangement No. 8.

The Standard Multivane Fans are built in a range of twelve sizes with capacities from 2,500 c.f.m. to 80,000 c.f.m. for single inlet fans and up to twice this amount for double inlet.

These fans have been designed for moving air at low and medium velocities against moderate resistance, such as the resistance due to air flow through ductwork, heaters, etc. They give vibrationless and quiet operation and require a minimum of attention.

## RANGE OF CAPACITIES.

Fan No.	Volume C.F.M.	Size of Inlet Diam.	Size of Outlet
2½	1,500-4,000	1ft. 3in.	1ft. 3in. x 1ft. 0in.
3	2,200-6,000	1ft. 6in.	1ft. 6in. x 1ft. 2in.
3½	3,000-8,000	1ft. 9in.	1ft. 9in. x 1ft. 4in.
4	4,000-10,000	2ft. 0in.	2ft. 0in. x 1ft. 6in.
5	6,000-16,000	2ft. 6in.	2ft. 6in. x 1ft. 11in.
6	9,000-23,000	3ft. 0in.	3ft. 0in. x 2ft. 3in.
7	12,000-31,000	3ft. 6in.	3ft. 6in. x 2ft. 8in.
8	16,000-40,000	4ft. 0in.	4ft. 0in. x 3ft. 0in.
9	20,000-50,000	4ft. 6in.	4ft. 6in. x 3ft. 4in.
10	25,000-65,000	5ft. 0in.	5ft. 0in. x 3ft. 9in.
11	30,000-75,000	5ft. 6in.	5ft. 6in. x 4ft. 2in.
12	35,000-90,000	6ft. 0in.	6ft. 0in. x 4ft. 6in.

Construction details, complete capacities and general information are given in Bulletin No. 3201

The above is a very condensed table. Detailed capacity tables are available for each size of fan and will be supplied together with any other information on request.

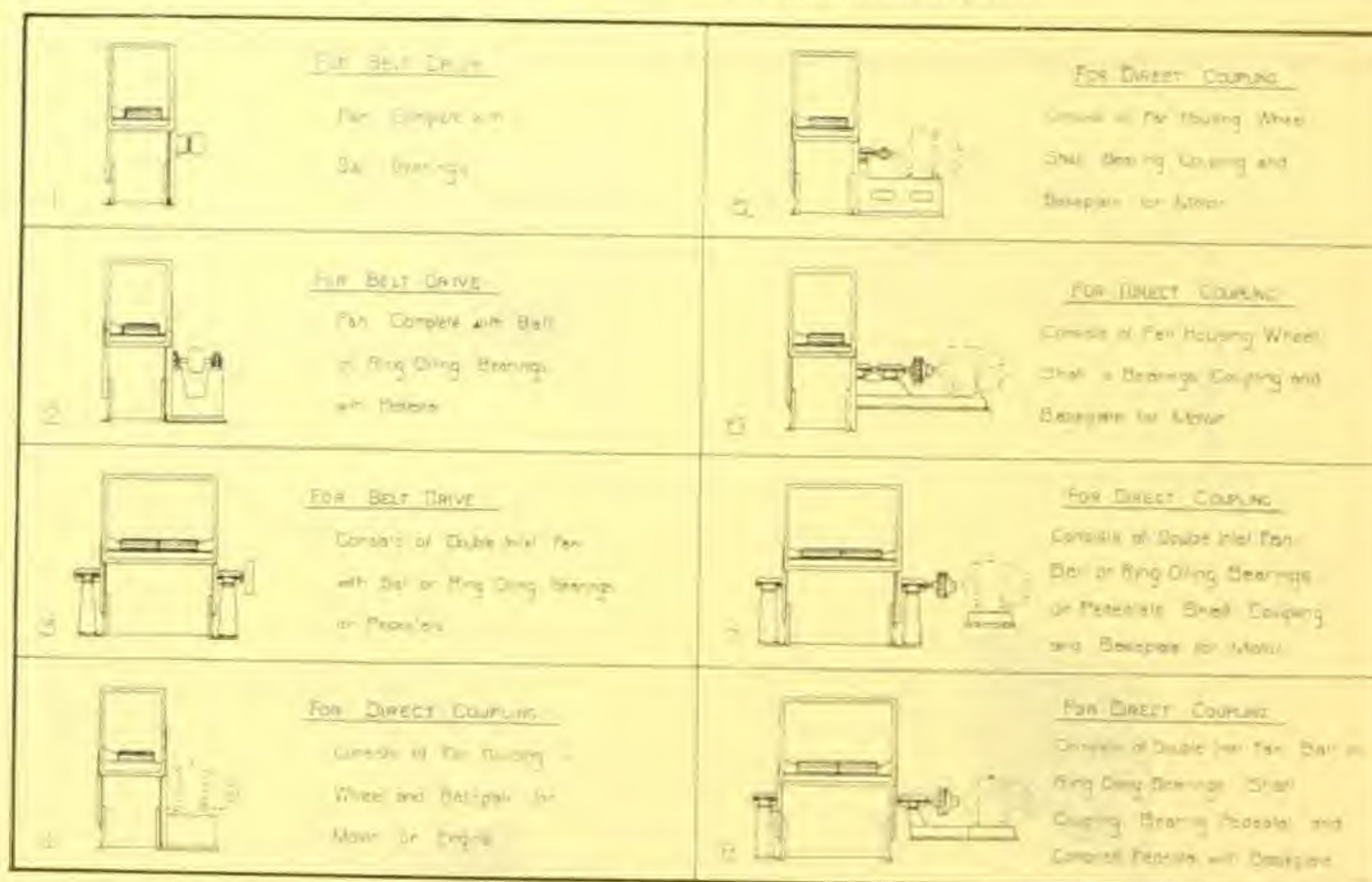
## Fan Type

The type refers to the position of fan discharge in relation to the inlet. Fans are supplied in eight standard types designated by the letter A to H.

- A = Right Hand Undercast.
- B = Left Hand Undercast.
- C = Right Hand Overcast.
- D = Left Hand Overcast.
- E = Right Hand Upcast.
- F = Left Hand Upcast.
- G = Right Hand Downcast.
- H = Left Hand Downcast.

## Fan Arrangement

The term arrangement refers to method of drive. There are eight standard arrangements, which are designated by the numbers 1 to 8, as shown on the diagram opposite.



FAN ARRANGEMENT.

## "PARVANE" CENTRIFUGAL FANS

In addition to the Standard Multivane Fan, a Richardson High-Speed Centrifugal Fan called the Richardson "Parvane" Fan has been developed and is available in all standard sizes and capacities. This fan possesses the important advantages that it can be

operated at speeds much higher than the Multivane Fan for the same duty, and it is non-overloading. These advantages permit the use of motors of the exact horsepower necessary and consequent reduction in first cost when large Direct Coupled Fan Units are being considered.



## BABY CENTRIFUGAL AND PROPELLER FANS

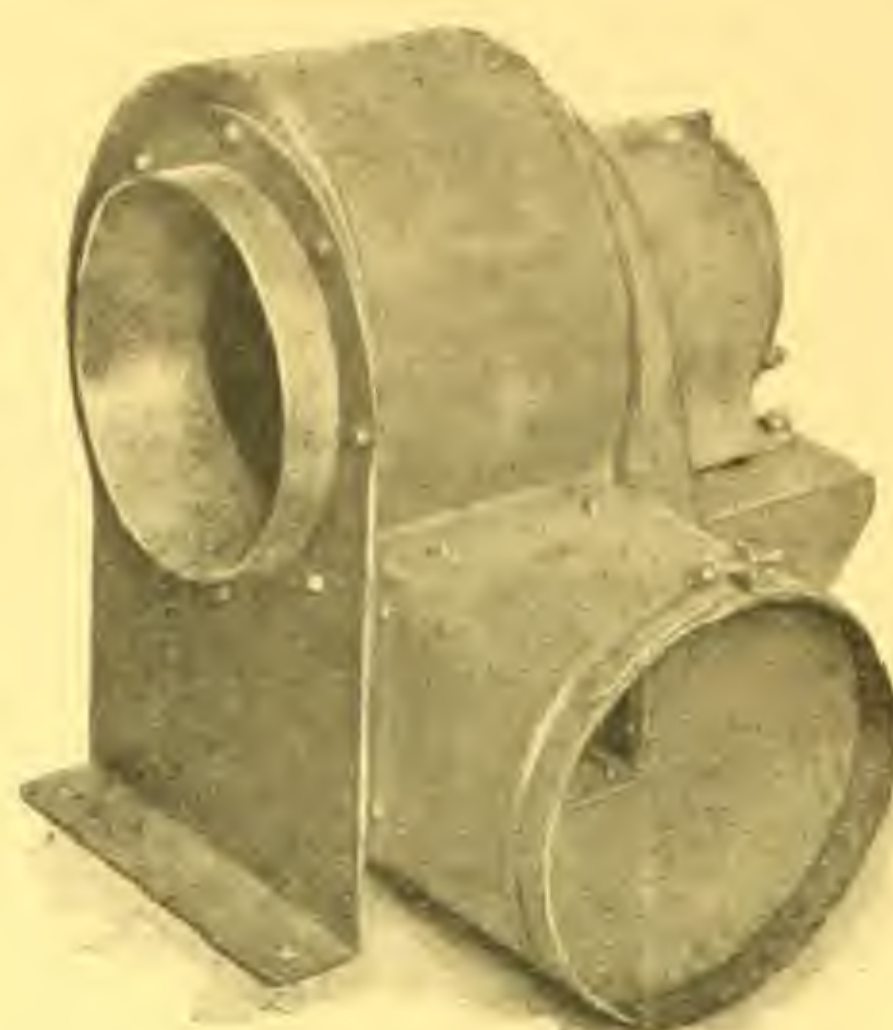
Richardson Baby Multivane Centrifugal Fans, Special Baby Kitchen Exhaust Fans and Baby Propeller Fans are suitable for all applications where the air requirement is less than 2,000 cubic feet for the Centrifugal Fans and 3,000 cubic feet per minute for Propeller Fans. They are furnished either for electric drive or belt driven. The Centrifugal Fans must be used when the air has to be delivered through pipes and the Propeller Fans when moving the air with free intake and discharge. The applications of these fans would be the ventilation of small rooms, kitchens, factories, spray booths, drying chambers, fume cabinets, chemical laboratories, etc., etc.

## BABY CENTRIFUGAL AND KITCHEN EXHAUST FANS.

Fan No.	Diam. Inlet and Outlet.	Capacity, C.F.M.	B.H.P.	Weight of Fan, lbs.
1	6 in.	300/500	$\frac{1}{8}$ - $\frac{1}{4}$	25
1½	9 in.	600/1,200	$\frac{1}{6}$ - $\frac{1}{2}$	50
2	12 in.	1,000/2,000	$\frac{1}{4}$ - $\frac{1}{2}$	84

## BABY PROPELLER FANS.

Diam. of Fan.	Capacity, C.F.M.	Speed, R.P.M.	B.H.P.	Weight, lbs.
16 in.	1,500	1,450	$\frac{1}{6}$	55
18 in.	2,200	1,450	$\frac{1}{4}$	60
20 in.	3,000	950	$\frac{1}{3}$	70



Baby Multivane Fan.  
(Electric Drive, Inlet Size.)



Front View.



Back View.

Motor-driven Baby Propeller Fan.

## ENQUIRY

One Richardson Baby Centrifugal Fan to handle ..... c.f.m. through approximately ..... ft. of ..... ins. straight pipe with ..... right angle bends to be used to exhaust (and/or deliver) this air in accordance with particulars on sketch herewith, the fan to be driven by an electric motor or belt drive. (If motor, state whether one or three phase, A.C. or D.C.)

One Richardson Baby Propeller Fan to handle ..... c.f.m. to be located in (state position) and to be driven by electric motor (or belt). If motor, state whether one or three phase A.C. or Direct Current and give sketch of application, if possible.

## PROPELLER FANS

Richardson Propeller Fans are manufactured in two designs, one for Direct Drive by electric motor, and the other for Belt Drive. The design in each case enables the fan to operate under the most efficient conditions, having due regard to the speed of the motors available and the conditions of the application. In the case of large fans it is now customary to adopt a multiple Vee Belt Drive instead of direct coupling, in view of the slow speed at which the larger fans must operate.

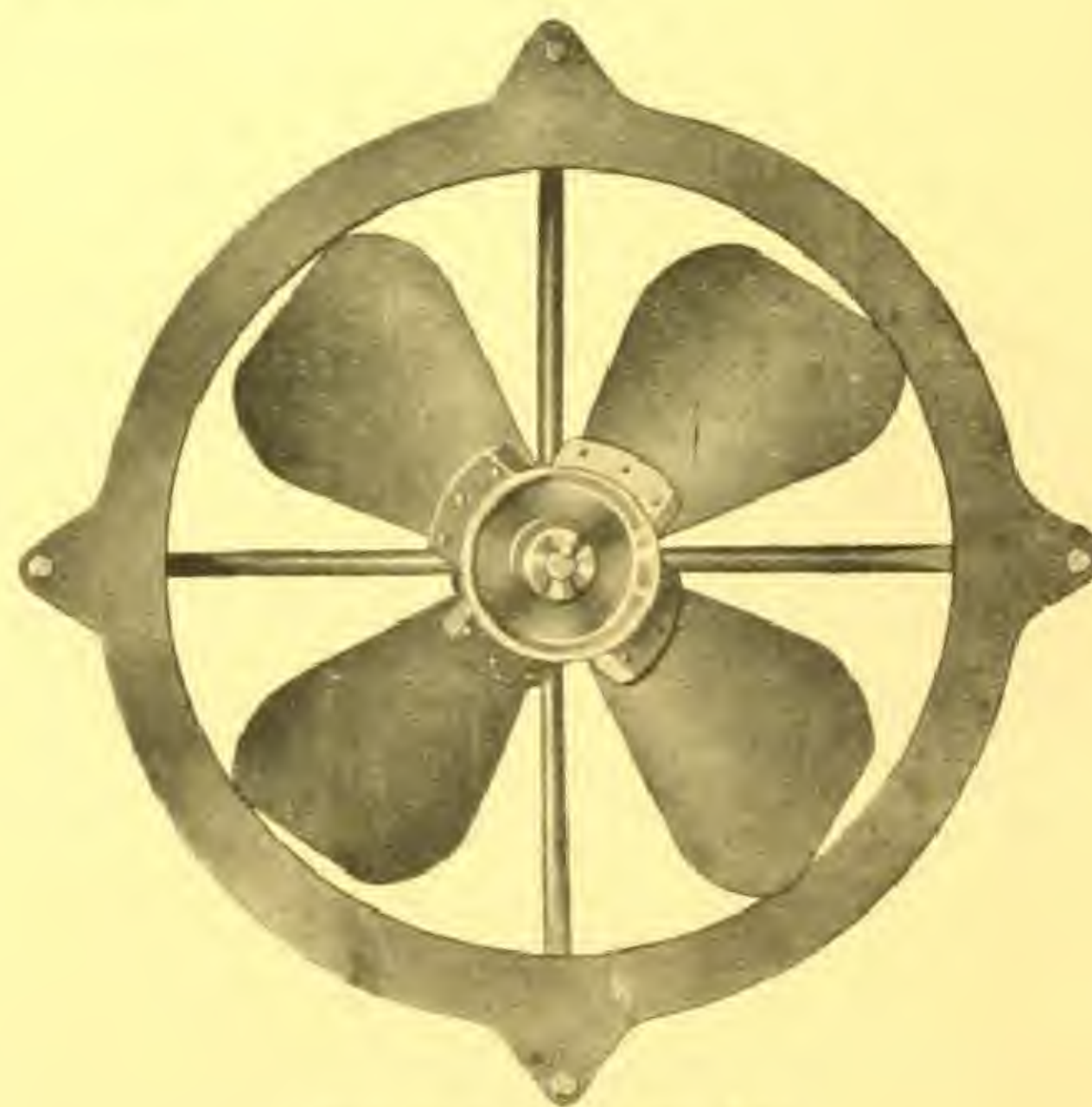
## CAPACITY TABLE.

Size of Fan.	C.F.M.	B.H.P.	Weight, cwt.
25 in.	4,000-6,000	$\frac{1}{2}$ - $\frac{3}{4}$	1
30 in.	6,000-9,000	$\frac{1}{3}$ -1	1½
36 in.	9,000-12,000	$\frac{1}{2}$ -1½	2
42 in.	13,000-20,000	$\frac{2}{3}$ -2½	3
48 in.	17,000-25,000	1-3½	4
54 in.	23,000-35,000	1½-4½	6½
60 in.	30,000-45,000	2-6	7
66 in.	36,000-52,000	2-8	9
72 in.	43,000-66,000	3-10	12

## ENQUIRY

One Richardson Propeller Fan to have a capacity of ..... c.f.m. when delivering (or exhausting) through (state position) to be suitable for wall mounting and to be arranged for electric drive (or belt drive). If electric drive, state whether one or three phase A.C. or Direct Current.

If the quantity of air requires to be varied, state the amount of variation required.



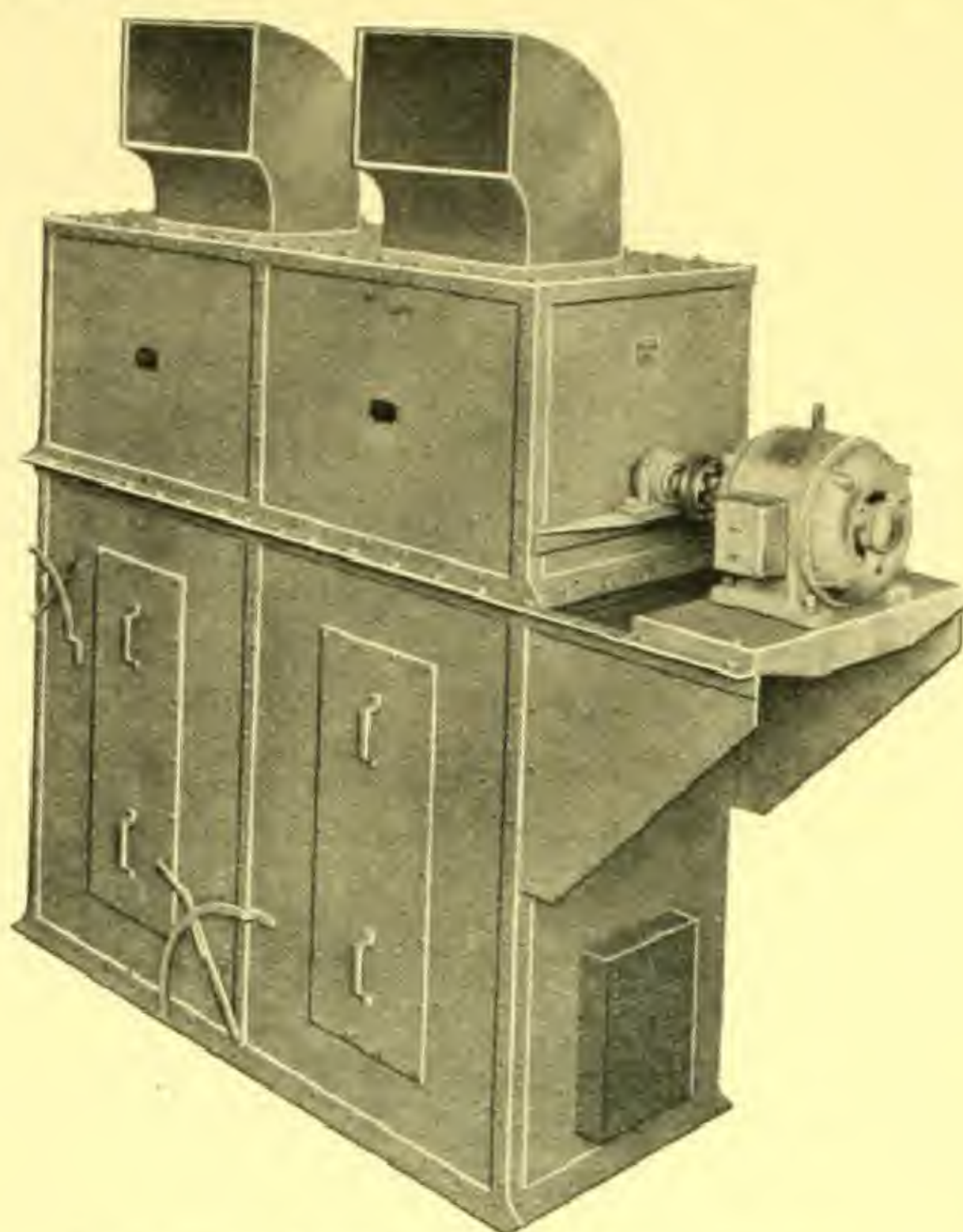
Belt-driven Propeller Fan.

(Continued on next page)



## HEAT DIFFUSING UNITS

These units have been designed and built for the express purpose of heating and ventilating industrial plants, machine shops and factories, having large area of floor space. In construction they are simple and compact and are built in various sizes and designs suitable for mounting on the floor (see Sketch 4, page 352) or supporting from the wall (see Sketch 8, page 353).



Richardson Floor Type Heat Diffusing Unit.

These units are especially adapted for packing plants, dye houses, laundries, etc. They are ideal for ventilating as well as heating and in summer can be arranged for cooling when required.

Richardson Heat Diffusing Units deliver and hold the heat down where it is most required.

They quickly bring the rooms to the required working temperature by immediately delivering the warm air to the working zone and holding it there by recirculation.

The basic principles of the Richardson Heat Diffusing Units save up to 25 per cent. of fuel bill by cutting down waste caused by overheating the upper portion or dead zone of the building. This fault

is characteristic of the usual factory heating systems, which have to be operated at maximum capacity to heat the working zone, the upper zone being overheated, resulting in a costly waste of fuel.

Richardson Heat Diffusing Units can be automatically controlled, thus giving a variation of heat output to coincide with the fluctuations in outside temperature, the maximum volume of air being maintained throughout, but the temperature varying constantly, the air being diffused at a temperature sufficient to balance heat losses from the building and maintaining uniform heating of the working area with considerable saving in fuel consumption.

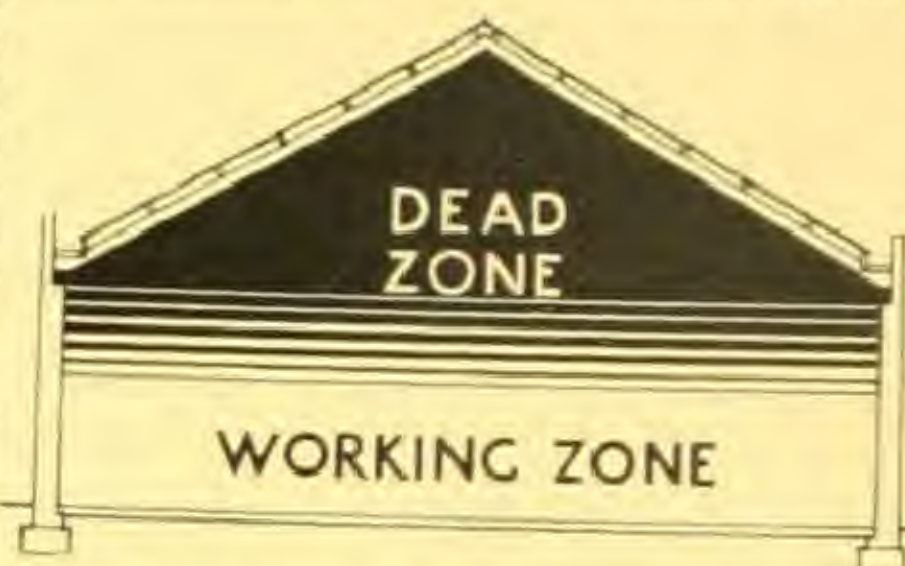
These units operate efficiently and silently. The Richardson Centrifugal Fan has large volumetric capacity at slow and medium speeds.

The heating surface is of the Macintosh Copper Fin Type, strongly constructed with cast-iron headers suitable for operating at any desired steam pressure. (For further data on Copper Fin Type Heaters, see page 359.)

## OUTPUT CAPACITY—RICHARDSON HEAT DIFFUSING UNITS.

Unit No.	R.P.M.	Motor H.P.	Cub. Ft. Air Per Min.	Entering Air at 60° F. 5 lbs. Steam.		
				Outlet Temp. °F.	B.T.U. Per Hour.	Lb. Cond. Per Hour
1 D.1	151	1,450	1,500	125	96,000	99
2 D.1	152	1,450	3,000	125	192,000	199
1 D.1	201	950	2,600	125	166,000	172
2 D.1	202	950	5,200	125	332,000	344
1 D.1	251	750	3,500	125	225,000	233
2 D.1	252	750	7,000	125	450,000	466

Larger sizes made for any duty.



Mill Exhaust Fan.

## OTHER RICHARDSON PRODUCTS

The Richardson line also covers the manufacture of a complete range of Mill Exhaust Centrifugal Fans for handling dust, shavings and similar material, High-Pressure Centrifugal Fans for delivering air to Oil Burners, Forges, Furnaces, or any application requiring air under pressure up to 2½ lbs.. A complete range of Commercial Vacuum Cleaners is produced both of the Stationary and Portable type for one or more sweeper capacity as desired. This equipment is of the multi-stage pattern and can be supplied for any vacuum necessary and complete with a full range of accessory equipment.



Pressure Blower.

Full information on any of the above products will be furnished on request to our nearest Agents:—

Crossle & Duff Pty. Ltd., Collins House, Melbourne, Victoria.  
Crossle & Duff Bros. Ltd., 52 Bridge Street, Sydney, N.S.W.  
The Engineering Supply Co. of Aust. Ltd., Cr. Edward and Charlotte Streets, Brisbane, Queensland.

Messrs. Frank De Rose & Co., 78 Waymouth Street, Adelaide, South Australia.  
Atkins (W.A.) Ltd., 894 Hay Street, Perth, West Australia.  
Cory-Wright & Salmon, Box 1230 G.P.O., Wellington, N.Z.



## "VENTEX" AIR FILTER

### Necessity of Clean Air

An air supply free from dirt or other solid contamination is highly desirable. All air, even the air of the countryside, contains a certain amount of dirt, but the air of towns, especially that of industrial areas, contains such an amount as to have a very detrimental effect on the health of the inhabitants. Moreover, the effect of dirty air in all kinds of machinery is to shorten its effective life and very much increase the cost of maintenance.

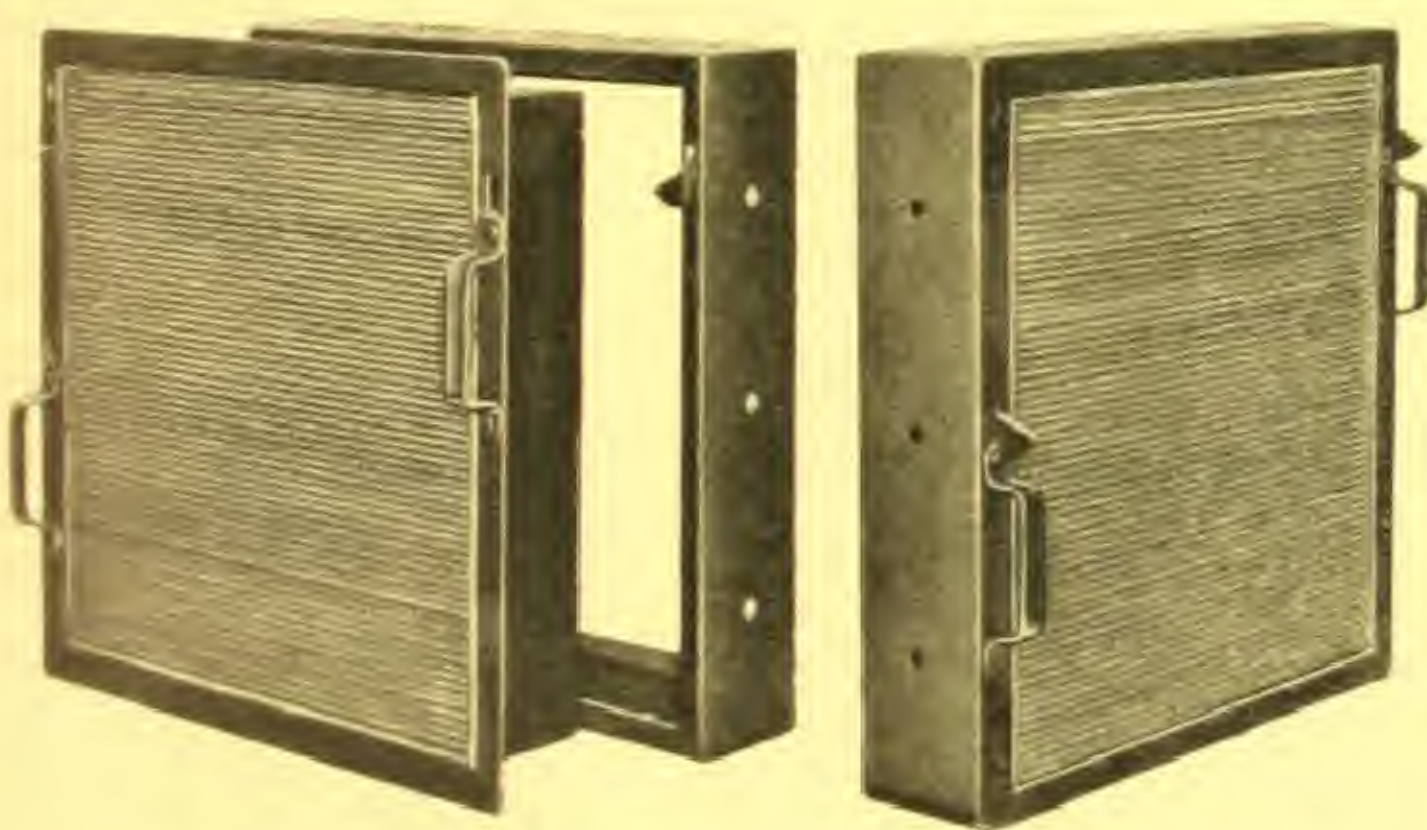
Many industrial processes are dependent for their success on being conducted in a clean atmosphere, and public opinion at the present day demands that places in which food products are prepared and handled should be kept in a clean state, not only as regards the place itself, but also the atmosphere. Apart from this, clean air means a very considerable saving in the cost of decoration, cleaning, etc.

It must be obviously less expensive and troublesome to trap the dirt in one central position than to collect it after it has settled on walls or furniture, and thus the best method of cleaning is to pass the air through a really efficient filter in which dirt is effectually trapped.

### AIR FILTERS

There are several types of filters in use, but all of them possess inherent defects in a more or less pronounced degree, i.e., the cloth screen which quickly becomes choked, the air washer resulting at times in over humidification (it will not remove greasy particles such as soot), etc.

The "Richardson Ventex" Air Filter is designed to supply a want for a thoroughly reliable and simple air cleaner which will have an efficiency as near as possible to the 100 per cent point.

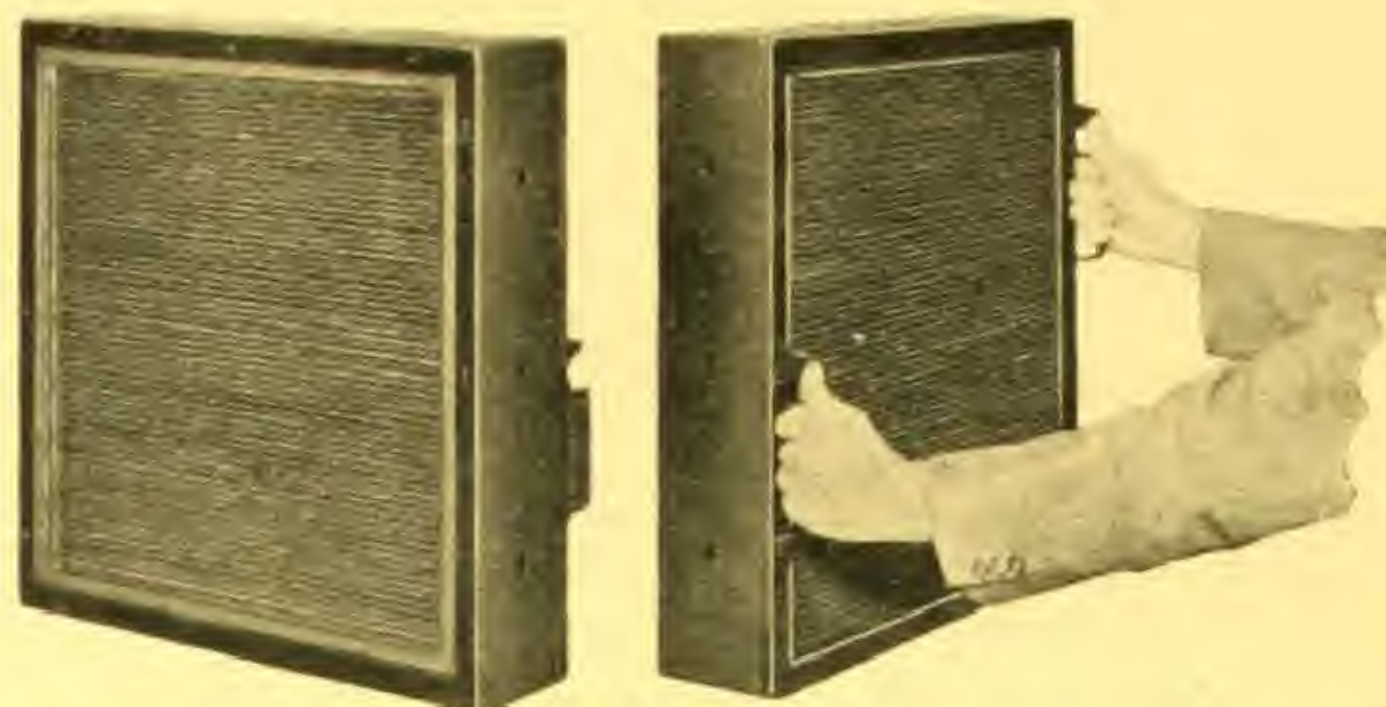


Front view, showing unit removed from frame (at left).  
Front view, showing unit fixed in frame (at right).

### Principle of the Richardson Ventex Filter

The principle of construction is that of a large number of plates spaced uniformly in a frame or holder. The plates are corrugated in a special manner and therefore expose a relatively large surface to the passage of air. The whole frame is dipped in a viscous fluid, and the air in its passage between the corrugated plates is buffeted from side to side, and the solid particles of dirt, etc.,

however minute, are retained on the sticky surface of the plates. The cleaning properties of this filter are highly efficient and it is practically impossible to detect the slightest trace of dirt in the air which has passed through a "Richardson Ventex" filter, no matter how dirty its previous condition.



Rear view, showing felt gasket for making dust-tight joint between unit and frame (at left).  
Front view, showing thumb-operated latch for removing unit from frame (at right).

### Description

The "Richardson Ventex" filter unit (see illustrations) consists of two parts, an outer frame and an inner case containing the filtering media.

The construction is metal throughout. The outer frame is so arranged that a number can be bolted together to form a filter of any capacity or any desired shape to fit into the space available. It occupies only a depth of about four inches.

The inner case, removed from the frame by handles, holds a number of plates of special section, which are fixed in the case at regular intervals. They are covered all over with the special viscous liquid, to which adheres the dirt collected from the passage of the air—free moisture in the air is also retained.

The cases are locked in position in the frame by automatic latches. When removing the case for cleaning, the handles are grasped, thus putting the thumbs in a natural position to release the latches. To ensure an airtight construction between outer frame and inner case a felt gasket is attached to the back flange of the frame and makes a close contact with the case, thus assuring at all times the full benefit of the high efficiency of the filter.

### APPLICATION

The most important use is for cleaning the air to be used for ventilating any form of building, shop, office, hospital, ship, restaurant, etc. The "Richardson Ventex" will trap soot, fog, grease, or dirt with equal facility.

These filters are especially recommended for filtering the air of telephone exchanges, and all places where delicate scientific apparatus is used or stored.

For all drying processes—for painting, enamelling and varnishing shops—for printing works—for power plants, etc.

(Continued on next page)



**Erection and Arrangement**

The erection of the Richardson Filters is simply and quickly performed by bolting together the specially drilled filter frames to form the complete filter, which in itself is a rigid and self-supporting structure.

It is desirable for cleansing purposes to keep the bottom row of frames a few inches from the ground.

The arrangement of the complete filter can be varied to suit the space available, or to fit any other set of circumstances.

The installation drawing shows the space required for any number of units up to 60, and the several arrangements possible in limited space. Others will readily occur to the Engineer or Architect.

**MAINTENANCE**

Under average normal conditions the filter requires cleaning but once every two months. The interval, of course, depends on the existing conditions and may vary from five to twelve weeks.

In large installations the rotation method of cleaning is generally adopted. By this means a number of cells are cleaned at regular intervals, thus maintaining an average condition and ensuring a constant air supply through the filter.

Spare filter units can be supplied to facilitate the cleaning of filters while plant is in operation.

**CLEANING BY CONTRACT**

Arrangements can be made for the annual maintenance and cleaning of the filter, when this form of service is preferred.

**METHOD OF CLEANING**

The cells to be cleaned are removed from their frames and shaken about in hot, strong soda water, and then rinsed in clean water and allowed to dry. They are then dipped in the adhesive liquid and drained before replacing in the outer frame. Special galvanized heating and cleaning tanks are supplied for this purpose.

**ARCHITECT'S SPECIFICATION****SPECIFICATION FOR SUPPLY OF AIR FILTER**

The Air Filter shall be of the Viscous Type and capable of efficiently cleaning.....cubic feet of air per minute.

**PERFORMANCE.**—The sub-contractor is to state definitely in his tender the cleaning efficiency of the filter and the resistance to air flow when handling the specified quantity of air per minute. Tenderers to suggest any convenient means by which the guaranteed cleaning efficiency may be measured. In the case of the unit filter, the resistance to be stated when clean, and when requiring to be cleaned.

**ERECTION REQUIREMENTS.**—The filter shall be complete in every respect ready for erection. All bolts, gaskets and accessories of any kind whatsoever that may be necessary for its assembly and erection shall be supplied.

The erection of the filters shall be by others.

**CHARGING AND MAINTENANCE.**—The units shall be supplied charged ready for use, and the tenderer is to state a price per annum for which he undertakes to service the filter, maintaining it in first-class condition, this price to provide for the supply of all charging liquid and the labour necessary to re-charge the filter units.

**DRAWINGS, ETC.**—A full description of the equipment shall be supplied, together with a plan giving the overall dimensions, which must conform to the space available for the accommodation of the air filter.

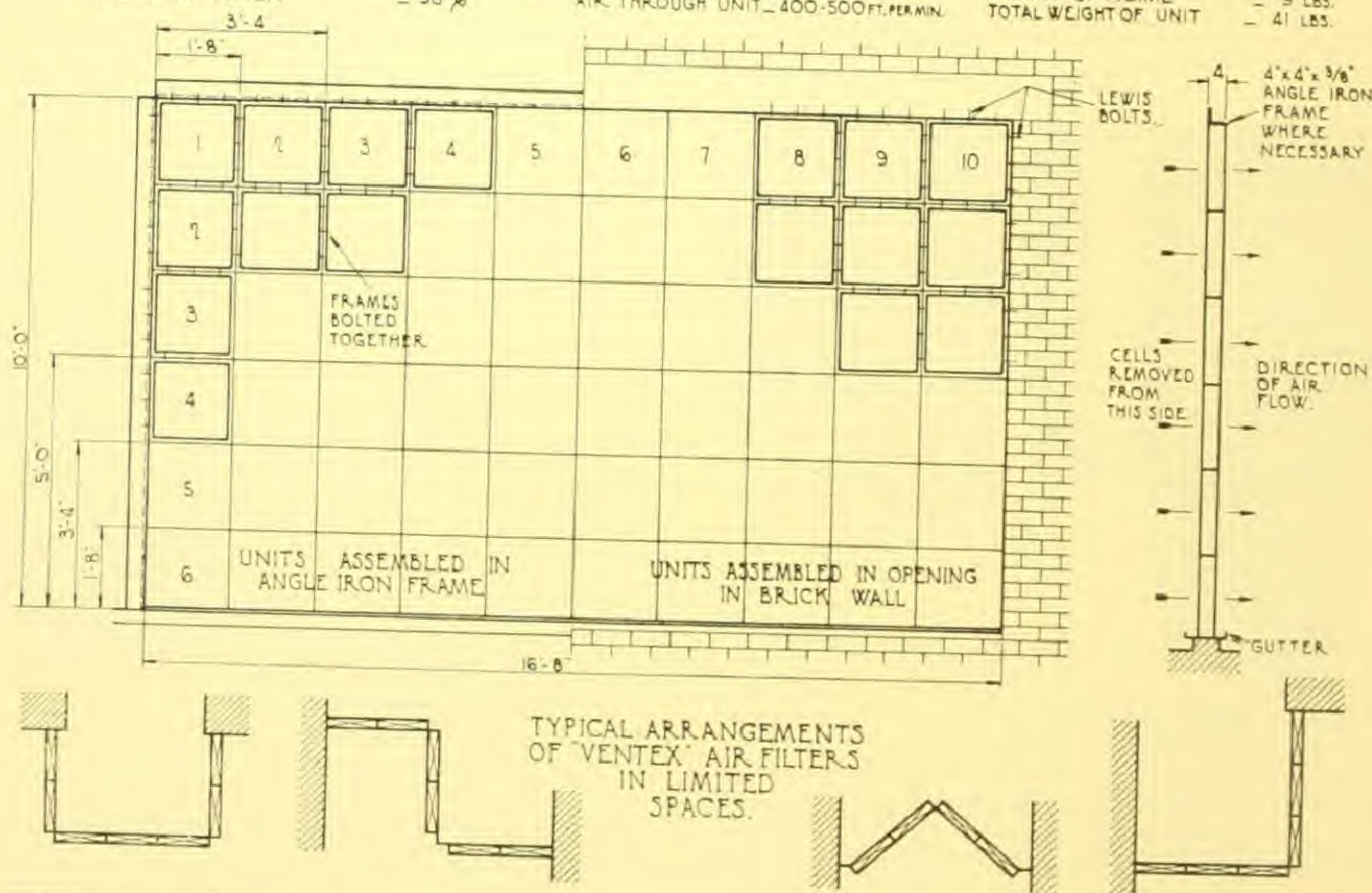
The tenderer is to state the Country of Origin of the equipment offered, together with a list of some of the more important users of the type of filter offered.

**DATA AND DIMENSIONS RICHARDSON "VENTEX" AIR FILTERS**

SIZE OF FILTER FRAME — 20" x 20" x 4"  
EFFECTIVE OPENING IN FILTER CELL — 2 1/4 SQ. FT.  
CAPACITY OF EACH UNIT — 1000 C.F.M.  
EFFICIENCY OF FILTER — 98%

SURFACE AREA OF FILTER PLATE  
IN EACH UNIT — 1000 SQ. FT.  
RECOMMENDED LINEAR VELOCITY OF  
AIR THROUGH UNIT — 400-500 FT. PER MIN.

RESISTANCE TO AIR FLOW — 1/4" W.G.  
WEIGHT OF FILTER CELL — 3 1/2 LBS.  
WEIGHT OF FRAME — 9 LBS.  
TOTAL WEIGHT OF UNIT — 41 LBS.





COPPER FIN-TYPE HEATING EQUIPMENT	<b>MACINTOSH &amp; CO.</b> PTY. LTD. 8 DORCAS ST., SOUTH MELBOURNE. <i>Manufacturers</i>	<b>CROSSLE &amp; DUFF</b> PTY. LTD. COLLINS HOUSE, MELBOURNE, C.1. <i>Sales Representatives</i>	
	Agents: Crossle & Duff Bros. Ltd., 52 Bridge Street, Sydney. Engineering Supply Co. of Australia Ltd., Edward & Charlotte Streets, Brisbane. Cory-Wright & Salmon, Wellington, New Zealand.		
	Frank De Rose & Co., 78 Waymouth Street, Adelaide. Atkins (W.A.) Ltd., 894 Hay Street, Perth.		30d  S.A.A. File No.

## PRODUCTS

*Fin-Type Heating Elements*, which may be built up to make any form of unit required.

*Blast Heating Units*, which are made in standard sizes and are complete with matching angles to take the ducts.

*Unit Heaters*. These are made in standard sizes and are classified according to the fan size and

B.T.U.'s capacity. They are complete with heater and fan combined in a casing of neat and pleasing appearance.

*Cabinet and Concealed Type Heaters* are made with standard elements, but may be supplied with varying types of cabinet or grill to suit surrounding furnishings.

## CONSTRUCTION

### Elements

The Macintosh type heating element is made up of  $\frac{5}{8}$  in. solid drawn copper tube threaded with thin copper fins, evenly spaced over the entire length.

After the tubes have been finned, the whole is carefully tinned, thus giving the fins metallic contact with the tube and preventing corrosion.

### Headers

The headers in all cases are made of cast iron of ample dimensions to withstand the required pressures with a very liberal margin of safety.

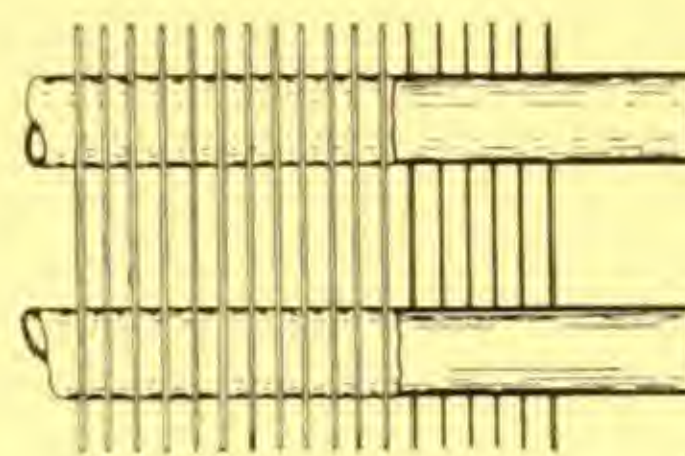
The headers are machined on the upper face to take the machined cover, which is fitted with a gasket and securely bolted down.

### Fitting of Elements

The required holes are drilled in the headers and the tubes of the elements are carefully expanded into these holes. The ends of the tubes are then beaded to add to the strength of the unit.

### Connections

The header covers are tapped to take the required size of steam or hot water pipe. Pipe connections between units are not supplied unless specially ordered.



Section of Drawn Copper Tubing with Rectangular Copper Fins.



Blast Type Heater installed at the Regent Theatre, Melbourne—2,250 sq. feet heating surface consisting of four units.

## FEATURES

### Efficiency

The high efficiency of the Macintosh heater is due to the careful selection of materials, copper having a very high thermal conductivity together with strength and lightness.

### Rigidity

The construction of the Macintosh heater is such that each unit is complete in itself; the tubes are securely fixed to heavy cast-iron headers and the whole is supported in an angle-iron frame or welded iron box, according to the type of heater, except in the case of the concealed type heater which merely has the elements and headers.

### Weight

The weight per square foot of heating surface is only about one-sixth of that of cast-iron heaters. One square foot of heating surface occupies only twelve cubic inches.

### Test

All Macintosh heaters are tested to 100 lbs. per sq. inch, or double working pressure, whichever is the greater.

### General

The Macintosh heater can be used to advantage for almost any purpose as it is practically non-corrosive, light in weight, compact and rugged in construction.

It is made in standard sizes and may be used as single units or in banks, according to the size of unit required.

It may be used to equal advantage on either hot water or steam up to 100 lbs. per sq. inch.

(Continued on next page)



## PRINCIPLES OF OPERATION

As the amount of heat given off from a certain object is dependant upon the temperature and the conducting surface of that object, the former being fixed, we have paid special attention to obtaining the maximum conducting surface in a minimum space.

We have achieved this objective by placing thin copper fins on solid drawn copper tubes, the fins being specially designed so as to cut down the amount of dead metal to a minimum when operating in an average velocity of air flow.

The elements are all fitted into a header at either end, the hot water or steam enters at one header and passes through the tubes of the elements to the other, giving up its heat to the walls of the tubes, which in turn conduct the heat to the fins. The heat is then conducted from the tubes and fins to the air.

It is due to perfect conduction being required that the fins are tinned to the tubes.

## BLAST HEATING UNITS

## Description

The Macintosh Blast Heating Unit consists of a fin-type heater, previously described, in a single unit or a combination of units mounted in a rigid angle-iron frame. This frame is drilled ready for the reception of the duct work.

The angle frame is integral with the legs which normally support the heater 9 in. from the floor, this may, however, be varied to suit requirements.

## Application

The Macintosh Blast Units can be used wherever a supply of heated air is required for drying and heating operations in various processes and for conditioning air for theatres, factories, etc.

On account of the low losses and the small mass of metal in the Macintosh heater, it is very sensitive in operation and may be automatically controlled by a thermostatically controlled valve to great advantage.

## Dimensions

A large range of sizes are available, made up of standard units. The standard units are made in four standard header sizes:—

Type A—18 in. wide.      Type C—24 in. wide.  
Type B—21 in. wide.      Type D—27 in. wide.

all by 6 in. deep, and may have either one, two or three stacks of elements varying in length from one to five ft.

Full particulars of capacities, and dimensions, are available on application.

## Ordering

When making enquiries, the following information should be given:—

1. Whether heater will be used with steam, giving pressure, or hot water, giving mean temperature of water.
2. Cubic feet of air to be heated per minute.
3. Velocity of air in feet per minute or size of duct.
4. Temperature of air to be heated.
5. Temperature rise required.
6. Plan showing dimensions of room of building, construction, windows and doors.

## UNIT HEATERS

## Description

The Macintosh Unit Heater may be divided into three parts: The standard Macintosh heating unit which is mounted in a sturdily constructed and attractively finished metal case. At the rear is mounted a small fan fitted to the shaft of an electric motor, which is supported by means of four neat brackets. Attached to the front of the unit is a series of deflectors to direct the flow of the air.

## Principles of Operation

The principle of the unit heater is to heat a room or building by means of passing the air contents of the room over a heating unit and deflecting the air to the most favourable parts. As the mass of metal in the heater is particularly small, it is very sensitive to temperature variation, and therefore lends itself very readily to automatic control by means of a thermostatically operated valve. Alternatively, as the capacity of the heater is dependent upon the velocity of the air passing the element, the temperature control may be obtained by means of a thermostatically operated switch in the motor circuit.

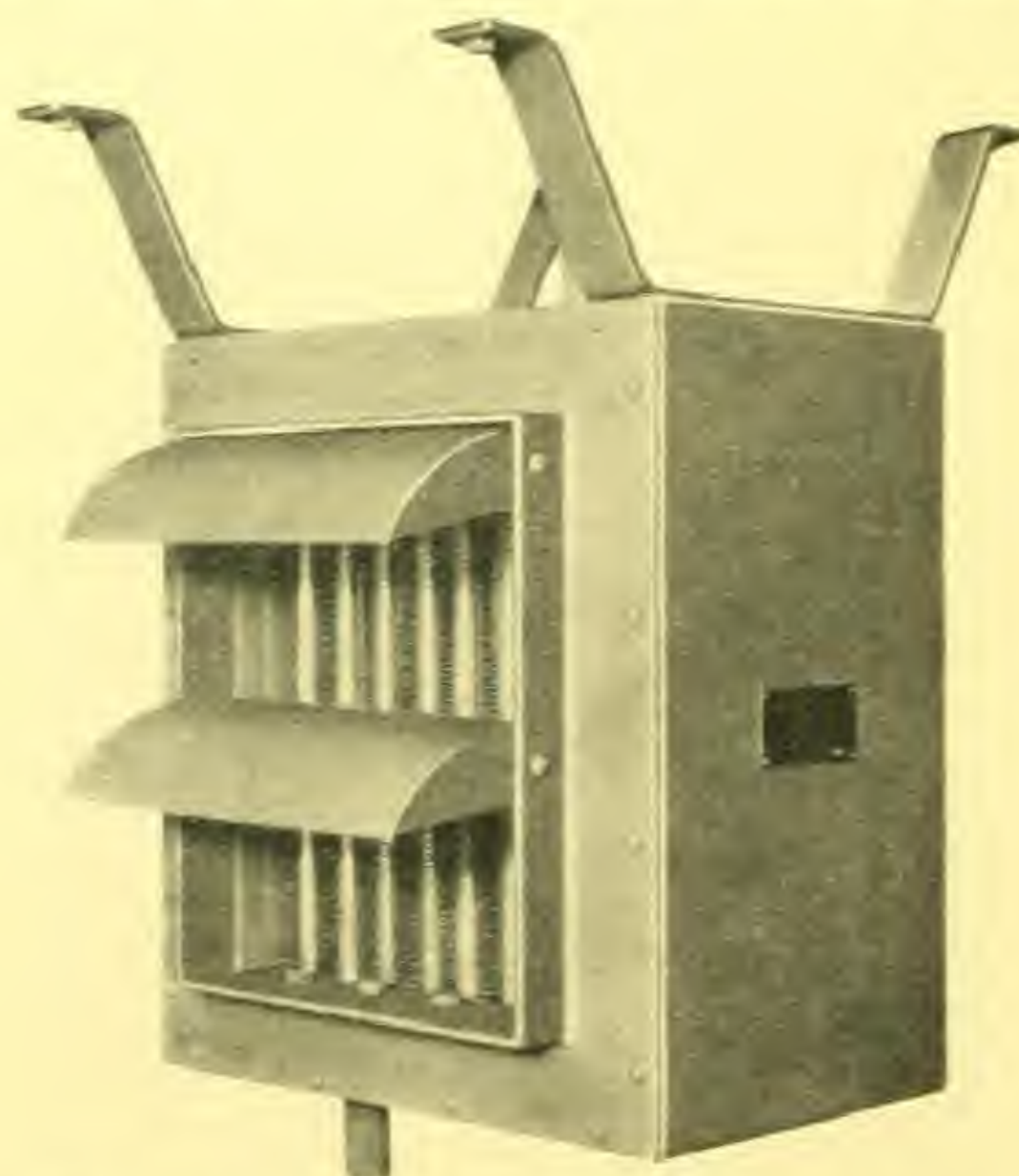
## Application

The combined lightness of weight, high efficiency, low cost of installation and small space occupied by the unit make the Macintosh Unit Heater a very favourable proposition for the heating of factories, warehouses, large offices, drying rooms, etc.

## Ordering

When placing an order or making an enquiry, please give the following information:—

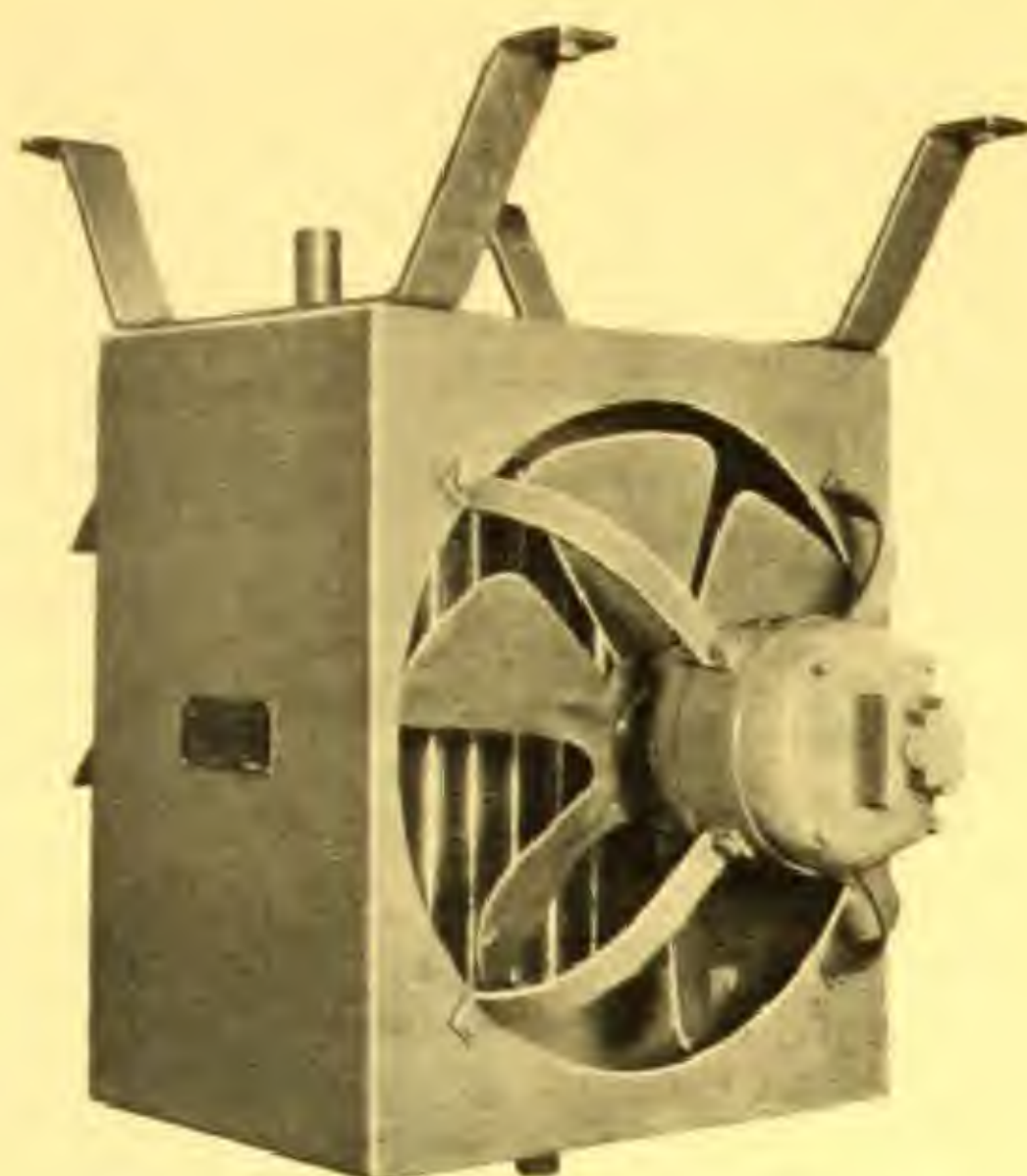
1. Type of building (whether brick or wood), also sketch.
2. Cubic feet of air to be heated.
3. Temperature rise in air required.
4. Maximum air temperature required.
5. Whether heating medium is hot water or steam, giving mean temperature of water or steam pressure.
6. Electric supply, whether D.C. or single or three phase A.C. and voltage.
7. Whether required for very silent operation or otherwise.



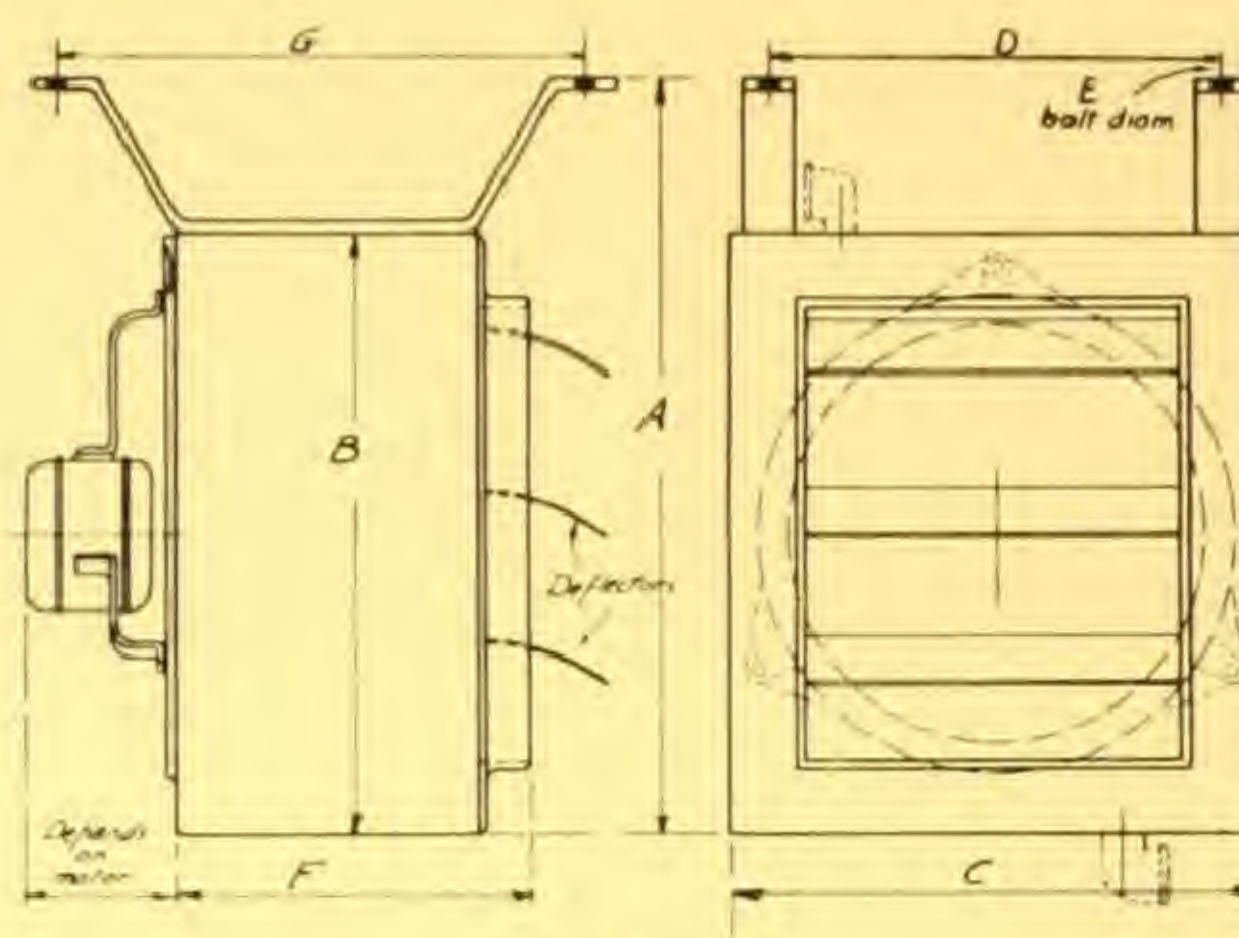
Front view of a small Unit Heater showing the deflectors, the number of which are increased with the size of Heater.



## UNIT HEATERS (Continued)



Rear view of small Unit Heater showing the neat arrangement of the fan and motor.



DIMENSION.

Size	A	B	C	D	E
15	2ft. 3in.	1ft. 9in.	1ft. 6½in.	1ft. 3½in.	2in.
18	2ft. 6in.	2ft. 0in.	1ft. 9½in.	1ft. 6½in.	2in.
21	2ft. 9in.	2ft. 3in.	2ft. 0½in.	1ft. 9½in.	2in.
24	3ft. 0in.	2ft. 6in.	2ft. 3½in.	2ft. 0½in.	3in.
27	3ft. 3in.	2ft. 9in.	2ft. 6½in.	2ft. 3½in.	3in.

No. of Stacks—2: F, 14 in., G, 20 in.; 3: F 15 in., G, 21 in.

## CABINET AND CONCEALED TYPE HEATER

## Description

The cabinet type heater consists of a Macintosh heating unit mounted in an attractive casing, suitable for placing on the floor. The concealed type heater is similar excepting that it is intended for mounting in a cavity in the wall and is supplied with grills of varying designs to permit circulation of the air.

## Principle of Operation

The principle of the concealed and cabinet type heaters is such that the air coming in contact with the heater expands and naturally rises. As the heated air is directed upwards by the casing the velocity of air passed by the heater increases considerably, thus causing a good circulation of heated air in the room.

## Application

The concealed type heater is specially designed for use in the home, as it takes up very little room and provides an even and comfortable temperature throughout the room, heating being effected by means of circulated heated air rather than direct radiation, as obtained with the ordinary cast-iron heater.

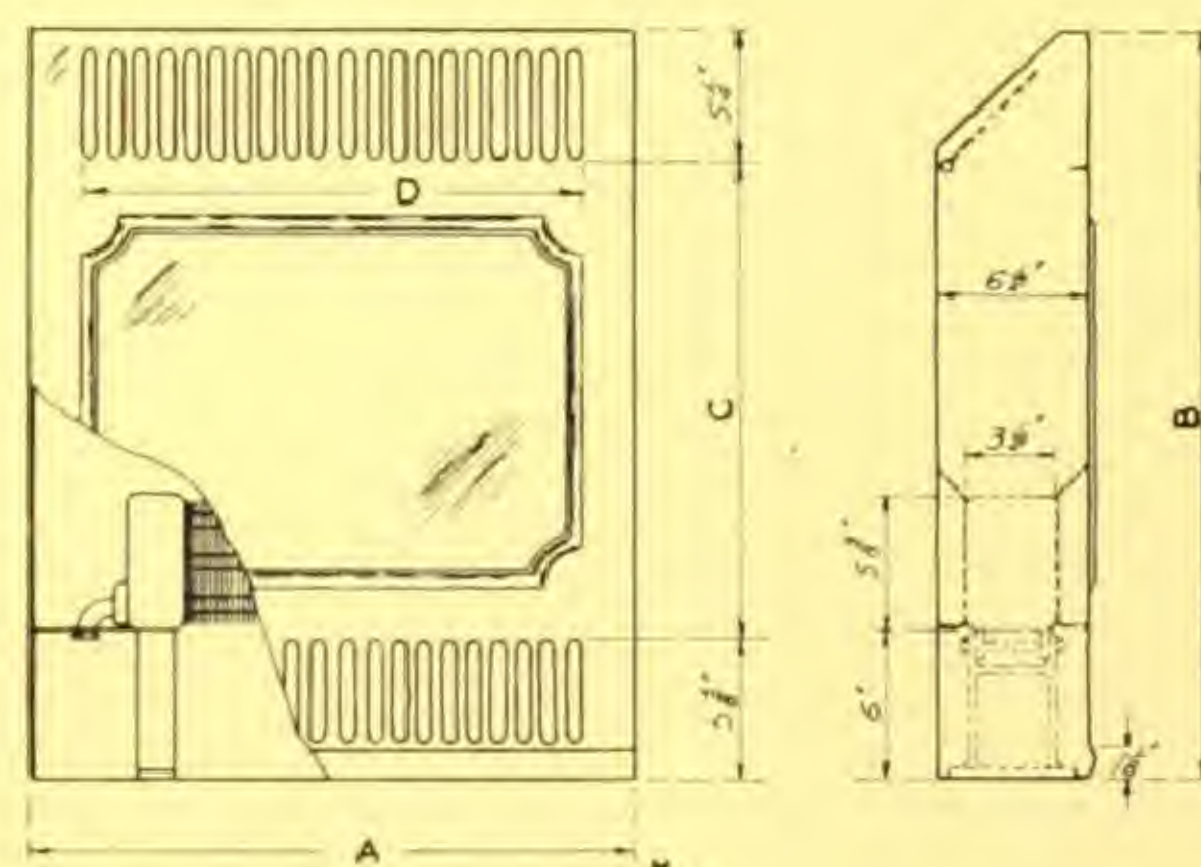
The cabinet type heater may be used in the home, but is more especially designed for use in offices, the principle of operation being the same as that of the concealed type.

## Ordering

When placing an order or making an enquiry, please give the following information:—

1. Construction of walls and ceiling (with sketch), showing position of doors and windows.

2. Cubic feet of air to be heated.
3. Temperature rise required in air.
4. Maximum temperature required.
5. Whether heating medium is hot water or steam, giving mean temperature of water or steam pressure.



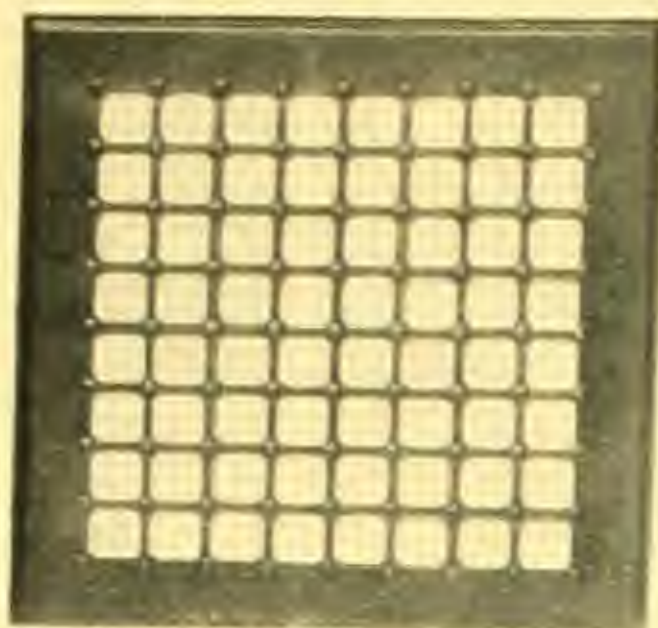
## Dimensions

The concealed type of heater is made in four different sizes of element with total widths of 24 in., 36 in., 42 in., and 54 in.; (a) all the above units may be supplied with casings of either 20 in., 26 in., or 38 in. high; (b) according to requirements; the depth in all cases is 6½ in. We will be pleased to furnish further particulars on application.

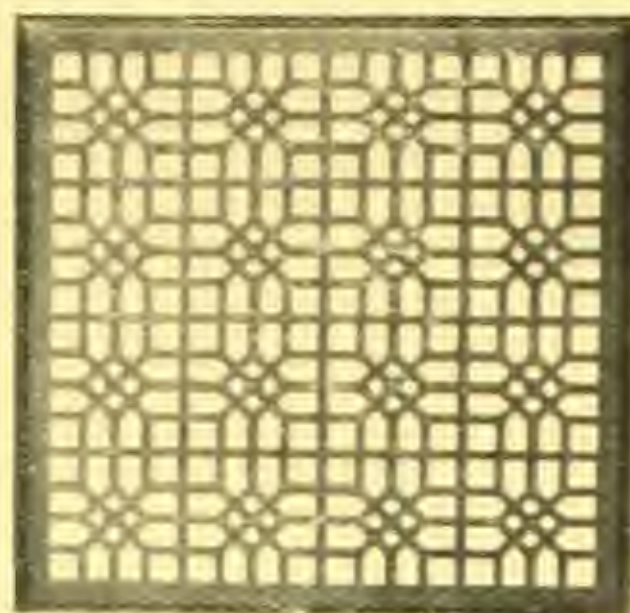
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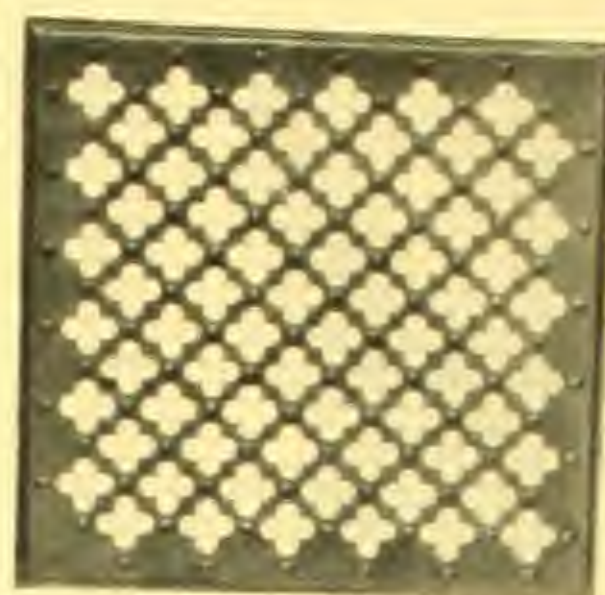
## PERFORATED SHEET METAL



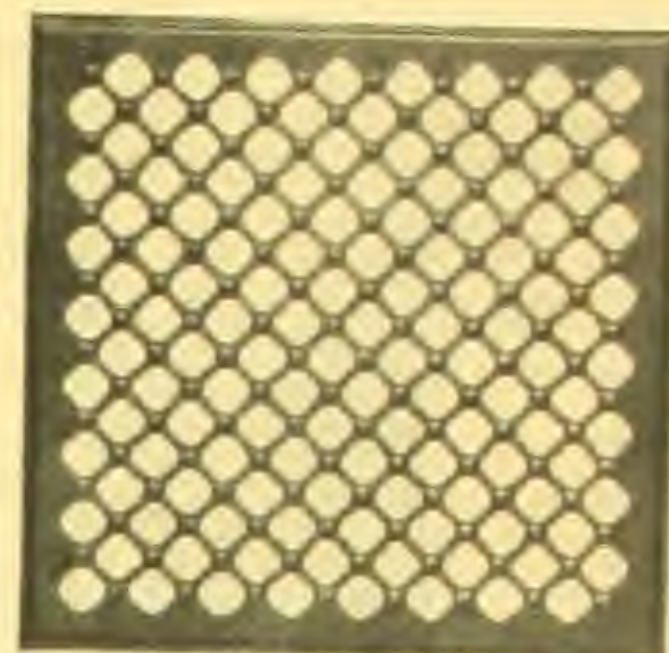
No. 4 Design— $\frac{1}{2}$ in. Hole,  $\frac{1}{2}$ in. Bar.  
No. 11 Design—1in. Hole,  $\frac{1}{2}$ in. Bar.  
No. 7 Design— $1\frac{1}{2}$ in. Hole,  $\frac{1}{2}$ in. Bar.



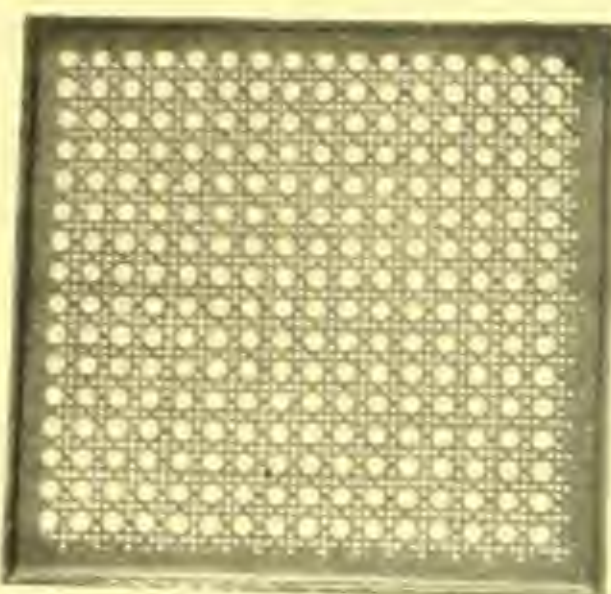
No. 15 Design.  
50 per cent. Free Area.



No. 6 Design.  
50 per cent. Free Area.



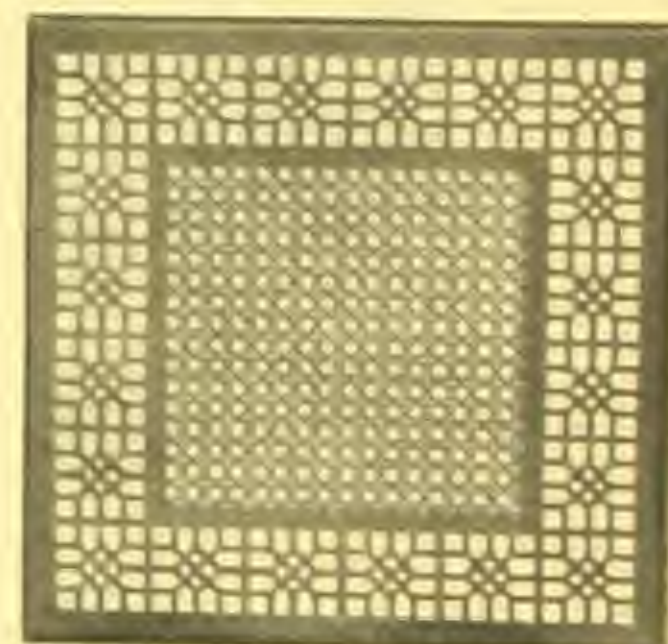
No. 14 Design— $\frac{1}{2}$ in. Hole,  $\frac{1}{2}$ in. Bar.  
No. 13 Design—1in. Hole,  $\frac{1}{2}$ in. Bar.  
No. 5 Design— $1\frac{1}{2}$ in. Hole,  $\frac{1}{2}$ in. Bar.



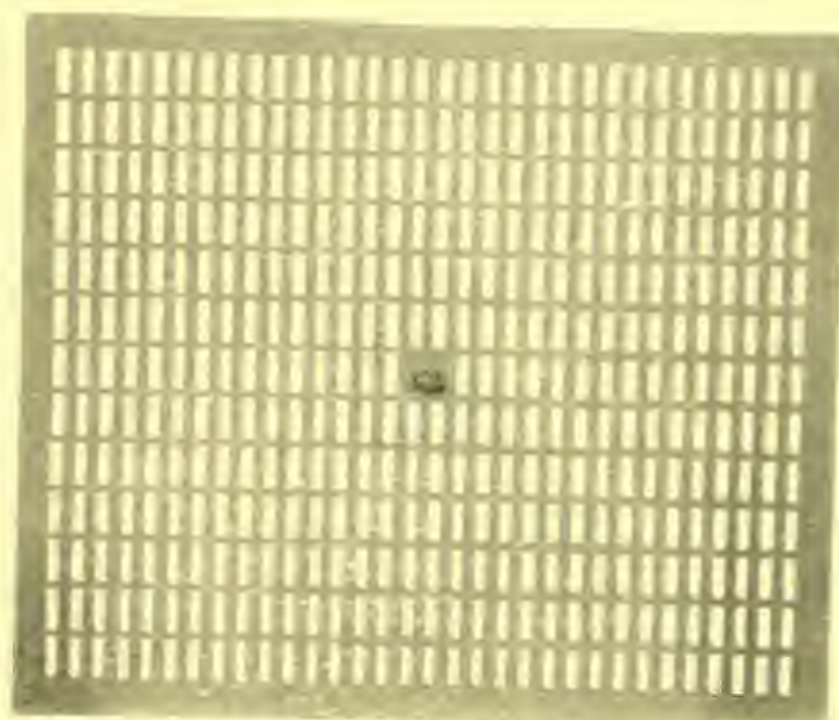
No. 16 Design.  
50 per cent. Free Area.

We supply Register Faces, Grilles, Louvred Panels, Gratings, and Perforated Sheets in Brass, Copper, Zinc, Steel, etc., in various gauges and finishes for concealing and protecting radiators, heating and ventilating work, partitions and general ornamental work.

We illustrate on this page a few of our many designs of perforated metal grilles and ventilators. A great variety of combination designs are also available. Any of the designs on this page may be attractively worked up, using one design as the border and another as the centre of the grille. (See illustration at right.)



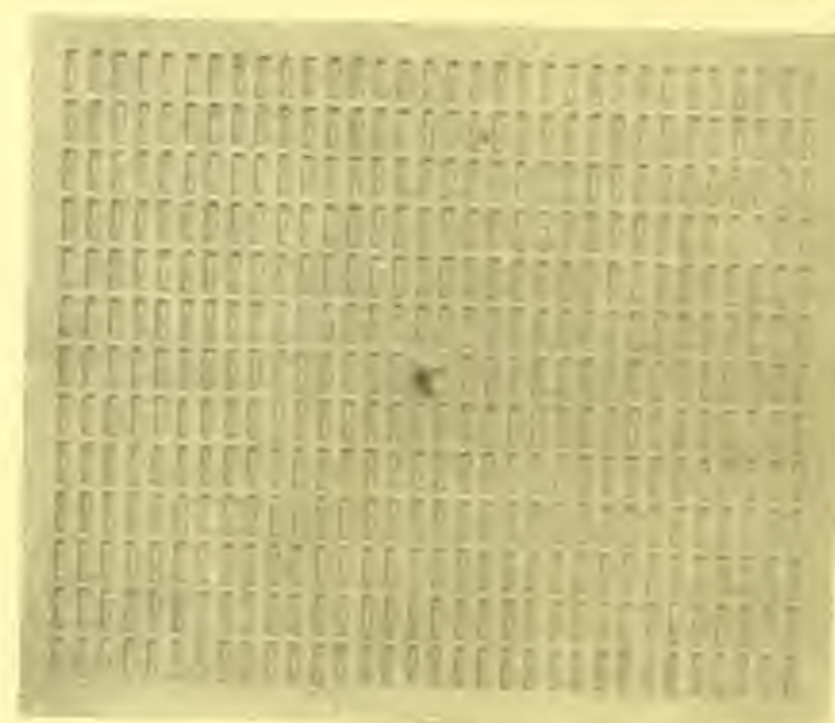
Ornamental Panel; any size.  
Plain margins left where required.

HIT AND MISS  
VENT FACES

(Left)—Open.

(Right)—Shut.

Any Size.



## AUTOMATIC LOUVRES



## LOUVRE PANELS.

Any size sheet—  
perforated where  
required.  
Length of Louvres—  
 $6\frac{1}{2}$  in., 8 in., 10 in.,  
13 in.



Louvre Closed.

Automatic Louvres are used where fans discharge to atmosphere; the operation of these louvres is affected by the simultaneous opening or closing of the blades. Back draughts are thus prevented from entering the building ventilated by the fan.



Louvre Opened.



OIL  
-O-  
MATIC  
—  
ENTERPRISE

## AUTOMATIC HEATING APPLIANCES PTY. LTD.

TEMPLE COURT, MELBOURNE, C.1

Interstate Representatives:

NEW SOUTH WALES: Messrs. J. Sainsbury & Co., Grose Street, CAMPERDOWN.

QUEENSLAND: Messrs. J. R. Wyllie & Sons Ltd., Albion, BRISBANE.

SOUTH AUSTRALIA: Messrs. Wm. Begg & Son, Charles Street, ADELAIDE.

30g

S.A.A. File No.

### Products

The following products are supplied by this firm:—  
Williams' Oil-O-Matic Oil Burners in various models for residences and buildings.

Williams' Ice-O-Matic Electrical Refrigerator for homes and small commercial installations.

Enterprise Rotary Oil Burners.

Powers' Automatic Temperature Controlling Systems, Thermostatic Regulators, Humidity Control Devices, Thermostats, Water Controllers, Shower Bath Mixing Valves.

Excelso Indirect Water Heaters.

McAlear Water Feeders and Controllers, Liquid Level Controllers.

Hydrolator Motor-driven Centrifugal Pump Units.

### Function and Service

The function of this firm and associated representatives is to make available to the Architect, Engineer, or others a complete line of world-wide approved automatic appliances designed for the express purpose of effectively heating atmosphere or liquids without having to resort to past methods of manual operations. We are prepared to discuss with Architect or Engineer all such heating problems with a view to submitting either advice or a definite quotation for a single item or a group of inter-related, fully automatic appliances to harmoniously, safely and efficiently provide a specific heating service.

Ample literature, supplementary to the data on these pages, is available on application.

### WILLIAMS' OIL-O-MATIC BURNERS

#### Application of Automatic Oil Heating

With assurance of satisfaction to your client, you may safely specify automatic oil heating for any purpose where a constant, accurate temperature is desired. Thermostatic control prevents fuel waste. The boiler or furnace operates at peak efficiency for only such periods of time as are necessary to replace heat losses. When such losses are replaced, the heat is automatically turned off. When the total cost of operating a hand-fired coal boiler is considered, very often oil heating indicates a decided economy.

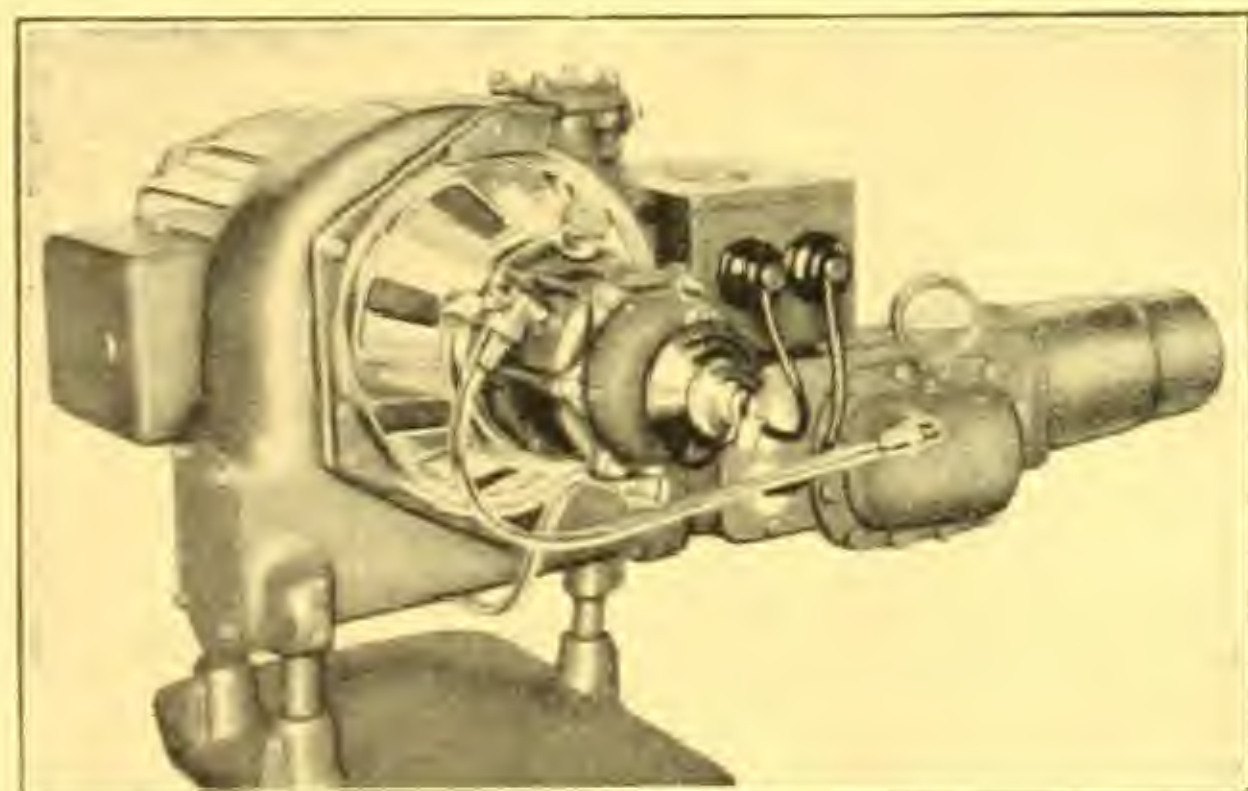
material. As the firebrick reaches a high temperature it reflects all heat back into the combustion zone. This radiant heat assures complete combustion.

1. "A minimum quantity of air must be positively supplied for combustion and mixed mechanically with the atomised oil." Oil-O-Matic complied with this requirement, as the fan delivers a specific quantity of air which is positively mixed with the atomised oil in the combustion chamber.

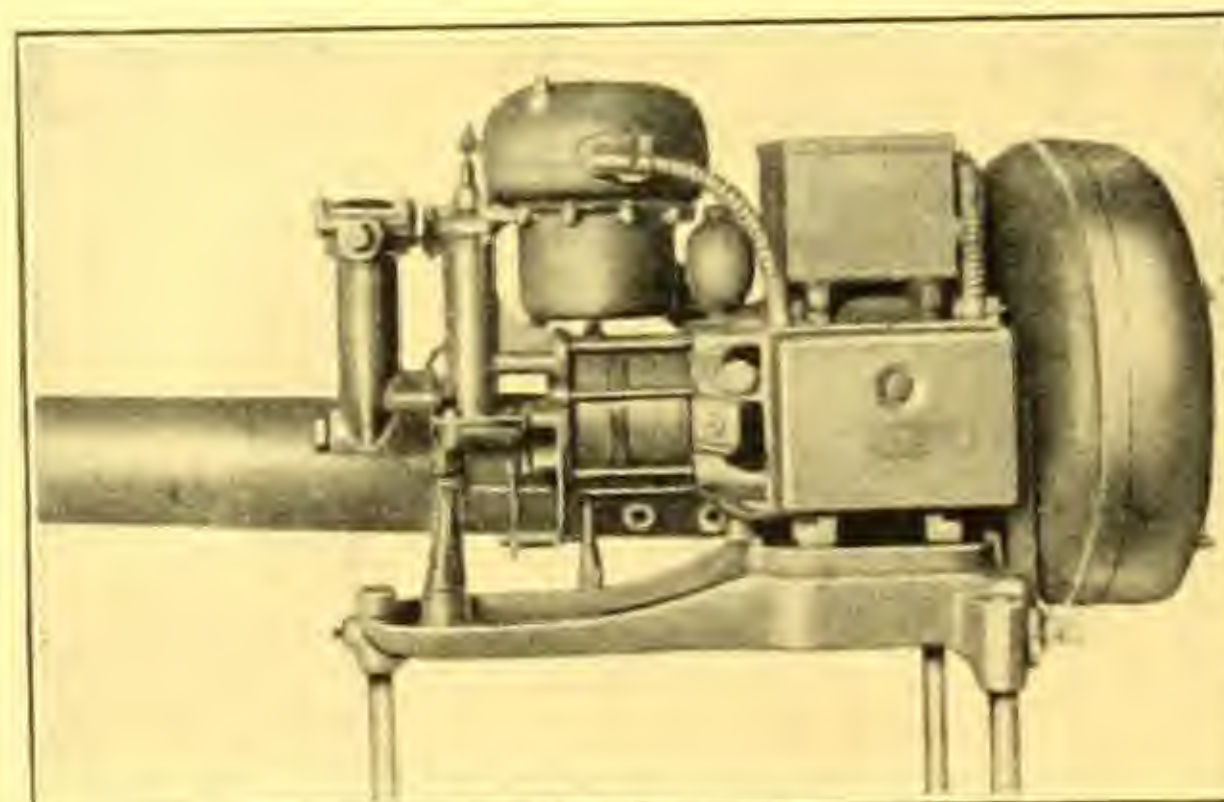
The Williams Oil-O-Matic burner not only complies with every fundamental principle of correct oil burning, but, in addition, the metering device guarantees a constant and uniform feed through the widest possible range of variations in viscosity of the oil.

#### MODELS—CAPACITIES AND DIMENSIONS.

Williams' Oil-O-Matic Burner.	Oil Capacity, Imp. Gallons Per Hour.		Overall Dimensions.		
	Min.	Max.	Length	Width	Height (Min.)
Model JJ	8	14	—	—	—
Model J 1,800	4	10	46	16	15½
Model J 1,200-2in. pump	1	5½	46	16	15½
Model J 1,200-3in. pump	1	4	46	16	15½
Junior Model	½	2½	38	31	15½



The new Oil-O-Matic Junior for smaller installations. The Diffuser is shown on the right side below the gauge.



The World-famous Oil-O-Matic Model J, which is heating more than 100,000 jobs in 44 countries.

#### IGNITION.

Oil-O-Matic requires no continuous low flame, pilot light, or continuous electric spark for dependable operation. The ignition is automatically turned on when a room thermostat indicates that heat is needed. This ignition operates for only a fraction of a minute until the atomised oil is fully ignited. Then the ignition is automatically turned off until needed again. Should the burner fail to function, for lack of fuel or any other reason, approved safety controls turn off the ignition, stop the burner, and shut off the oil supply.

(Continued on next page)



**Control**

The Oil-O-Matic is completely automatically controlled. The master control is an instrument known as a thermostat, generally placed in a central room of the house. The sensitive thermostatic mechanism responds to temperature changes, and switch mechanism is then actuated, resulting in the stopping and starting of the oil burner.

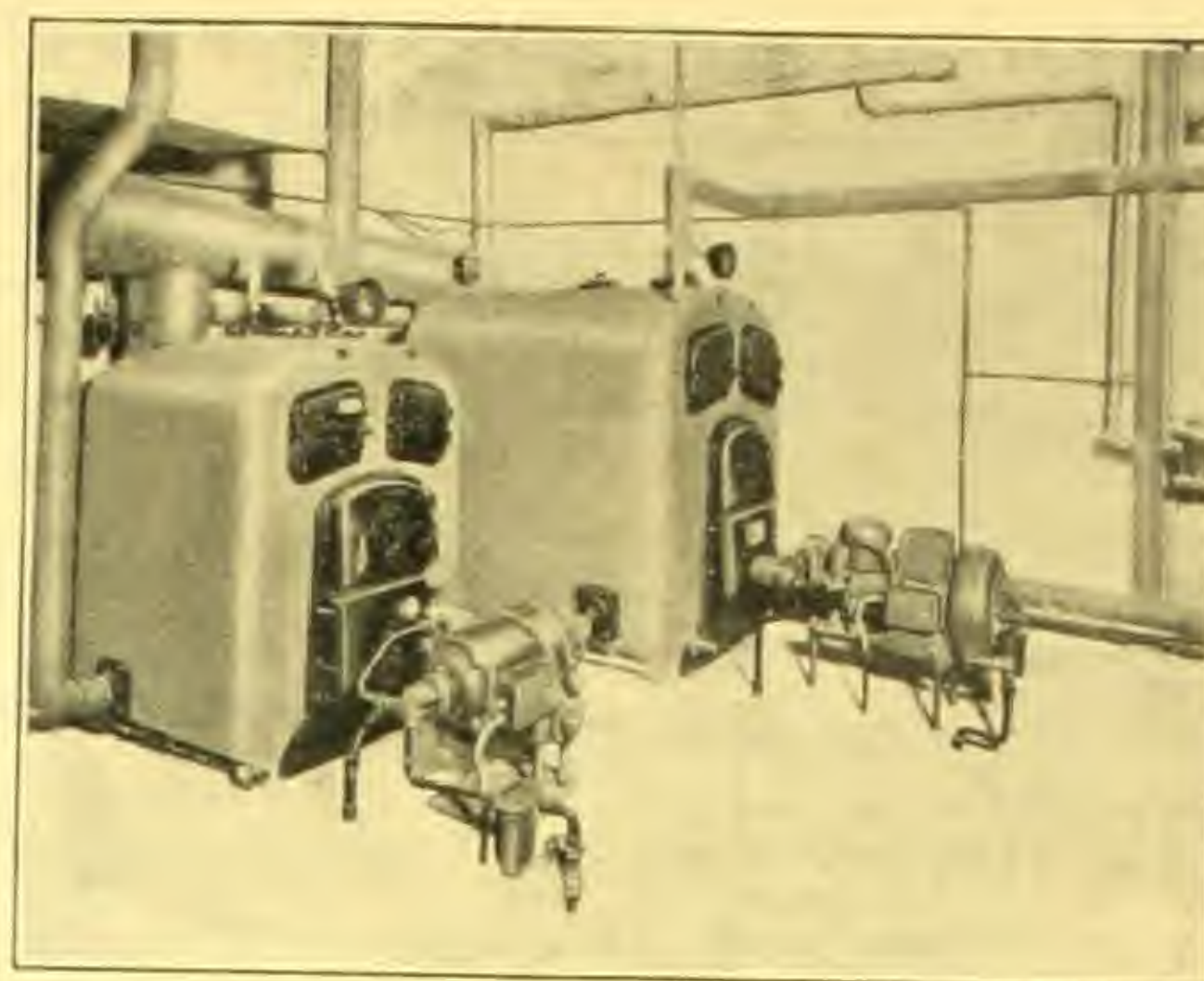
Safety devices and limit controls are regularly supplied with installations, ensuring efficient operation and eliminating any personal element from interfering in its operation.

**New Diffuser**

The Diffuser is a recent and important Williams Oil-O-Matic refinement. Its function is to steady the oil flow, so that it is delivered at the nozzle with almost a total absence of the flutter and fluctuation which is a common source of sound when an oil burner is in operation.

**Installation**

"No oil burner is any better than its installation." The proper installation of a Williams Oil-O-Matic burner will ensure its satisfactory operation, and this work can best be done by an authorised dealer, or by a heating engineer under our supervision. (See list on page 363.)



Installation of Oil-O-Matic Burners in a large Melbourne Building.

**REPRESENTATIVE INSTALLATIONS.****Victoria—**

Railway Offices Building,  
Temple Court.  
A.M.P. Society Building  
National Bank.  
State Theatre  
Town Hall.  
T. & G. Building.

**New South Wales—**

State Savings Bank.  
Hotel Metropole.  
B.M.A. Building.  
Tattersall's Club.  
Government Offices, Canberra.  
Hotel Kosciuszko.

**South Australia—**

Railway Station Buildings.  
State Savings Bank.

Tattersall's Club.  
Nutrition Laboratory.  
Hotel Richmond.

**Queensland—**

Canberra Hotel.  
Ipswich Hospital.  
Commercial Bank.  
Craigston Flats.  
Western Australia—  
Chennel House.  
Mental Hospital.

**Use**

Enterprise Oil Burners are adaptable for most any problem where heat is required. They have proven their performance on ranges as well as on big power boilers, small home heating furnaces, or big rotary kilns.

**Description and Operation**

Made in two types—Type E for Industrial, and Type A for Automatic burners. They are operated by an electric motor, mounted on same shaft with fan, one single, compact unit, producing necessary air for atomising and burning oil. Hinged either on a furnace plate or on a refractory tiled door, giving easy access to furnace at any time.

Fuel oil is supplied from an outside storage tank and brought in through the burner hinges, either fed by gravity or drawn in by a small oil pump, driven by a worm and gear off the burner shaft. The oil enters at rear into the shaft and later into atomising cup, where it is thrown off in a fine mist by centrifugal force of 3,500 r.p.m., and forced into the firebox by air blast from the burner fan, producing a very hot, soft and smokeless flame. Motor is entirely enclosed, dustproof, and cooled by the suction air from the burner fan. Air and oil supply regulated manually or automatically from boiler controls, giving high efficiency and close regulation for any boiler load.

**ENTERPRISE OIL BURNER**

Installation of Enterprise Burners in a Large Departmental Store, Melbourne.

**Types and Sizes**

**Type A**—Controlled by a thermostat for heat or an aquastat for hot water. Burns cheapest grade of fuel without smoke or carbon. Installation is simple and can be made in a few hours regardless of the type of boiler, heater or furnace. Automatic burners are furnished with gas ignition.

**Type E**—Made in all sizes. Suitable for any type of heating problem, furnished either in the pump or pressure type, burns any oil which can be pumped, regulated either manually or automatically on low and high pressure boilers. Can be installed either singly or in batteries, made either right or left hand swing, easy to operate, flexible in load variations, giving highest efficiency and requiring very little attention. Burner is equipped with Westinghouse alternating-current 60-cycle motors in single or polyphase, also burners with direct-current motors furnished on request.

**Representative Installations**

Children's Hospital, Frankston, Vic.  
Monsanto Southern Cross Chem. Co.  
G. J. Coles & Co. Pty. Ltd., Melb.  
Australian Club, Melbourne.

**CAPACITIES OF BURNERS.**

Burner Size	AA	A	B	C	D	E	F	G	H	J	K
Imp. Gals. per hour	1-24	1-45	2-6	3-11	5-14	6-16	8-25	12-28	16-30	20-38	30-72
Motor H.P.	1	1	1	1	1	1	1	1	1 1/2	2	2

For D.C. current add 1/6th to above capacities.



## POWERS REGULATORS

Automatic Temperature Control  
of Atmosphere

Uniform temperature conditions, besides being essential to good health, make for the full effectiveness of the worker in school, office or factory.

Automatic temperature or thermostatic control supplants the unreliable, wasteful, and always unsatisfactory hand regulation of controls on a heating system. Steam or hot water valves, for instance, open wide automatically as the temperature falls slightly, and close proportionally if the room temperature rises.

Type "D"  
Thermostat.Temperature Control for Industrial  
Purposes

Wherever heat is used in industrial processes, improved results follow its automatic control. Not only is fuel economy secured, but the product itself is in nearly every case improved if processed under the right temperature.

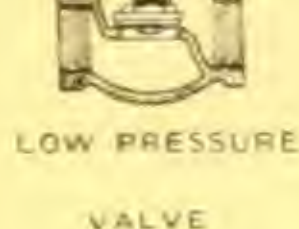
There are more than fifty different types of regulators made to control temperature of liquids, gases, and air in industrial purposes. Self-operated or compressed air operated types are used.

## Types

There are two general divisions into which devices for thermostatic control may be grouped: Self-operating and Compressed Air Operated.

Self-operated regulators are self-contained and operate without the aid of any outside power, such as electricity, compressed air, or water power.

(See diagram opposite.) A thermostat (for atmosphere control) or a thermostatic bulb (for liquid control) contains a sensitive fluid, hermetically sealed. This fluid vapourises when bulb is exposed to heat, developing a saturated vapour pressure corresponding to the temperature. This pressure is transmitted through flexible tubing to the all-metal bellows in top of control valve. Expansion and contraction of this bellows operates the valve which regulates flow of the heating or cooling medium to the receptacle under control.



to the temperature. This pressure is transmitted through flexible tubing to the all-metal bellows in top of control valve. Expansion and contraction of this bellows operates the valve which regulates flow of the heating or cooling medium to the receptacle under control.

Compressed Air operated regulators require a constant supply of compressed air at 15 lbs. pressure for their operation. Pipes deliver this pressure to thermostats in rooms, or to thermostatic bulbs in liquids to be controlled.

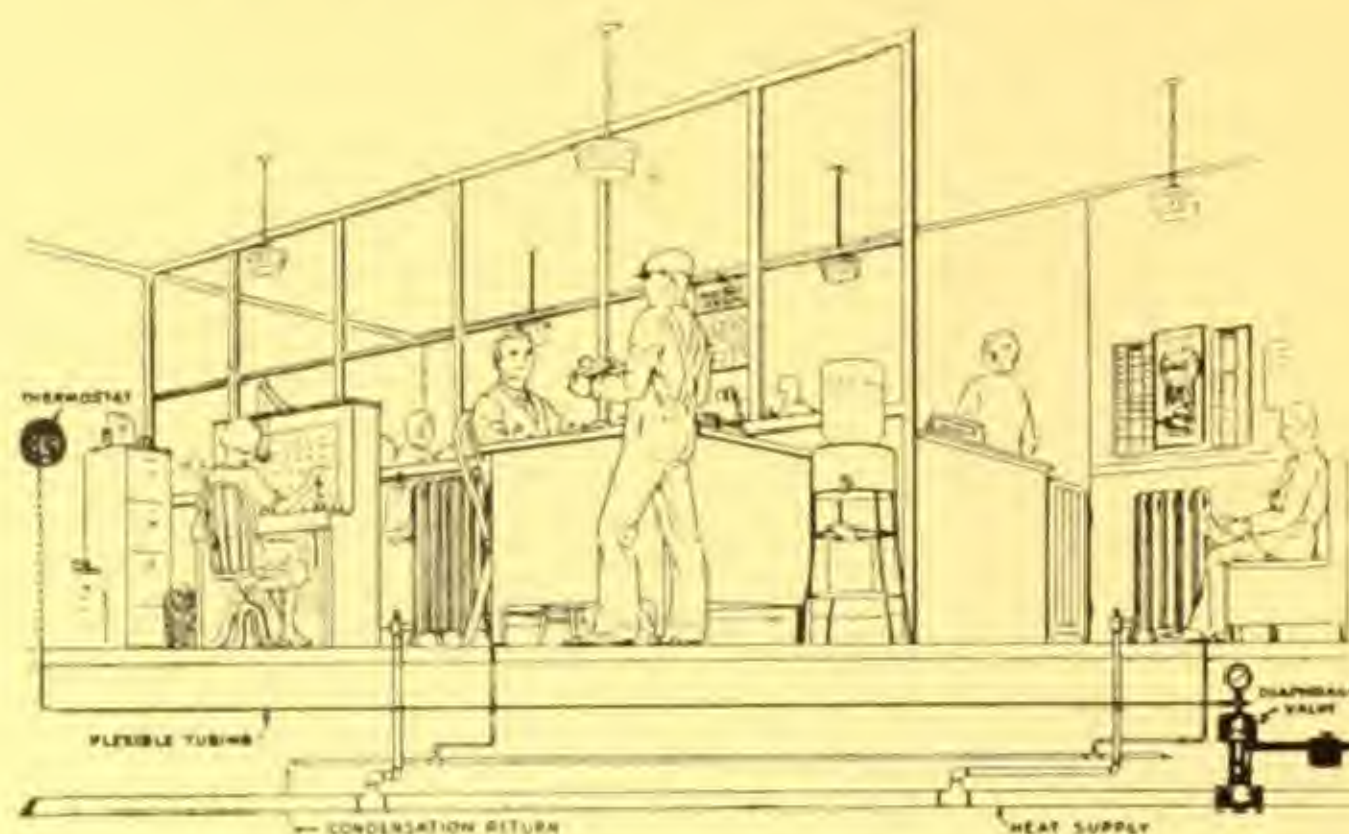
## POWERS No. 18.

Powers No. 18 is a self-operating temperature regulator for the control of atmospheric temperature in offices, shops, factories, storage rooms, drying rooms, warehouses and greenhouses.

Used for general control between the limits of 60 degrees and 100 degrees F., when such control can be obtained by the operation of a single valve regulating the supply.

## POWERS No. 10.

Powers No. 10 is a compressed air operated regulator. Several valves controlling the heat to various compartments may be regulated by the system. This type of regulation gives the most accurate control. It may also be used to control liquid temperature from 0 degrees up to 800 degrees.



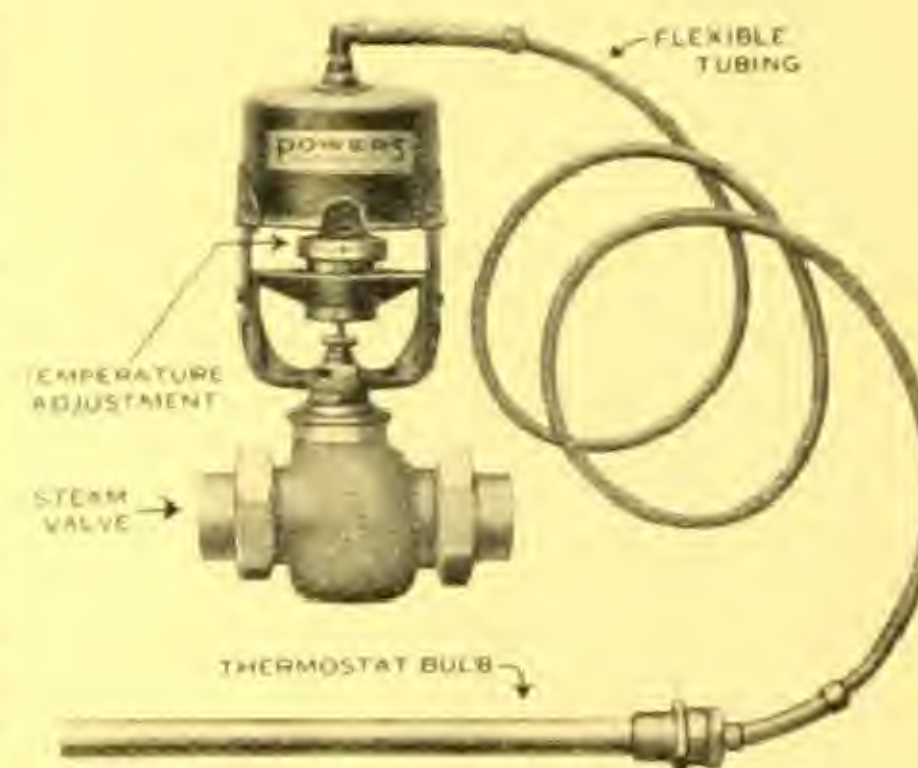
Powers No. 18 Regulator Applied to Direct Heating System.

## POWERS No. 11.

Powers No. 11 is a self-operating regulator for the control of liquid temperature applicable to hot-water tanks, calorifiers, vats, steam kettles, pre-heaters, washers, etc.

Used for systems or processes involving temperatures between 40 and 250 degrees F., but in no case may the individual regulator have an adjustment range of more than 20 degrees above or below the specified operating point.

For greater temperature ranges use a compressed air operated regulator.

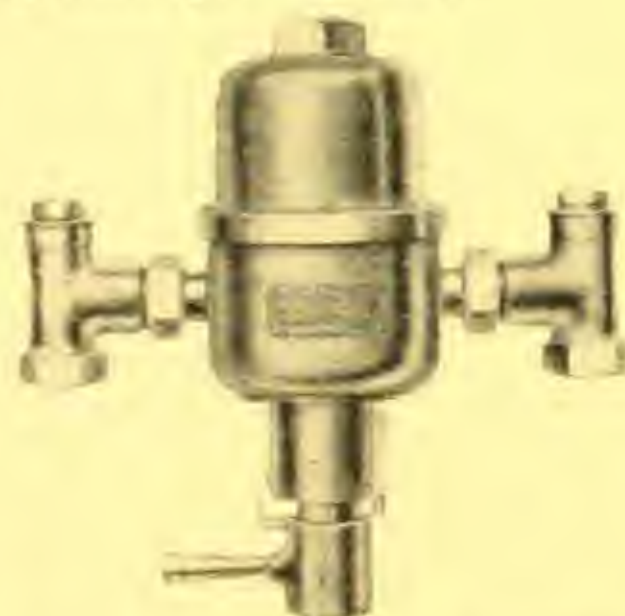


## Powers Thermostatic Water Controller

(Capacity 15 to 100 gallons per minute)

This type of controller mixes hot and cold water and delivers mixture at a constant temperature. It can be adjusted to maintain various delivery temperatures and the adjustment is limited so that the water above a predetermined temperature cannot pass. Failure of cold water supply substantially shuts off delivery.

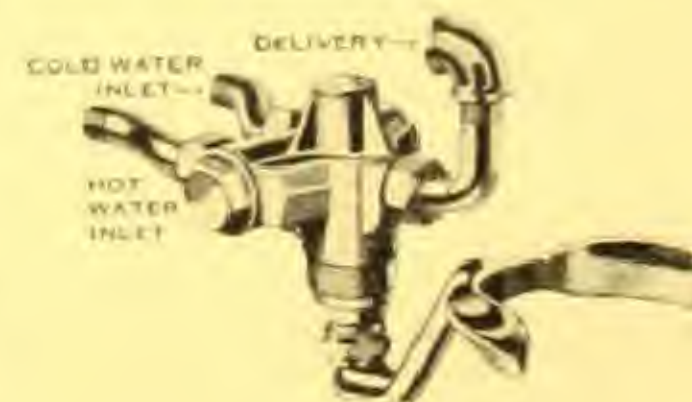
This controller may be used to supply warm water for the washing of woollens and delicate coloured goods laundries, paint rubbing in auto body plants, mercerising fabrics, washing photographic plates and films, gang showers, continuous flowing baths, etc.



## Powers Knee-Action Mixer

(For Surgeons' Wash-up Sinks)

With this mixing valve a surgeon can wash his hands without danger of scalding, and without the annoyance of unexpected changes in the temperature of the wash water. It is made entirely of bronze and brass, finished in nickel-plated. Mixer is simple in design, rugged, durable, and requires no foot pedals or floor attachments. Capacity is six gallons per minute under 40 pounds pressure.



(Continued on next page)



## MCALEAR WATER FEEDERS

## Direct-to-Boiler Water Feeder and Controller

Automatic control of water supply to boilers is most important to their safe and economical operation. Too much water means inefficiency and increased fuel costs. Lack of water means grave danger of fractures, burn-outs, shut-downs and expensive repairs. Therefore, on all modern installations, McAlear Water Feeders and Controllers are absolute necessities.

## Types

Manually fired boilers should be equipped with Simplex or Duplex feeders.

Oil or automatically coal fired boilers should be equipped with Combination Water Feeder and Controller with low water cut-out or low water and pressure switch.

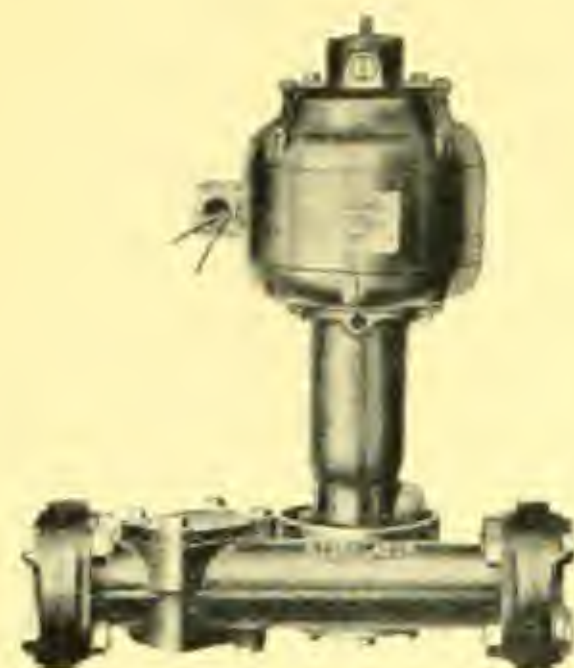
## No. 866 WATER FEEDER AND CONTROLLER.

(With pressure and low water cut-out switches for use on oil burners and automatic coal stokers.)

Supplies the make-up water necessary to maintain constant boiler water levels and at the same time protects the boiler

by sounding an alarm and/or shutting off the fuel supply, should the water supply pressure fail, or for any other reason the boiler water level reach the danger point.

In addition it is provided with a combination pressure and low water cut-out switch, which enable it to start and stop the oil burner or the automatic coal stoker between two definite pressures, and in case of low water, shut off the automatic fuel supply before any damage is done to the boiler.



## THE HYDROLATER

(For stimulating hot water circulation)

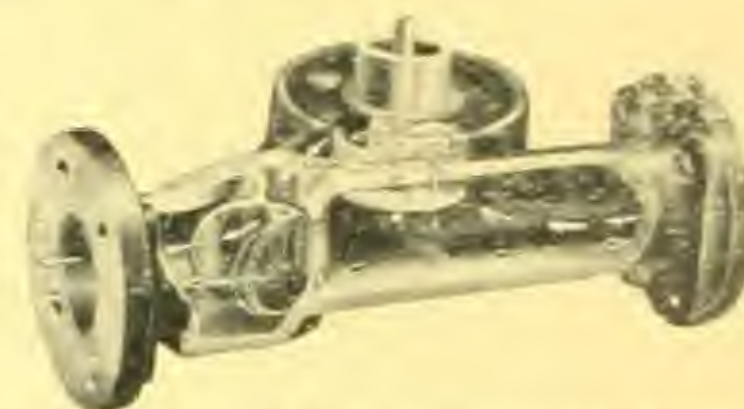
The Hydrolater is a motor-driven centrifugal pump designed to stimulate the circulation on balanced two-pipe hot water systems, open or closed type. It consists of a quiet, powerful Repulsion-induction Motor mounted on a 12-in. pipe section with the pump rotor located in the pipe section. Rotor is off the line of water flow so as not to interfere with natural circulation when the Hydrolater is shut off.

## The Hydrolater Principle

The faster hot water flows through a system the more heat it conducts to the radiators. That is the basic principle of the Hydrolater and that is just what this device does, namely: to circulate water several times faster than it flows by ordinary thermal action.

## Installation

Simply cut out a 12-in. length of the return line (if an existing system) near the boiler and thread the pipe for flanges. Flange unions are supplied with the Hydrolater.



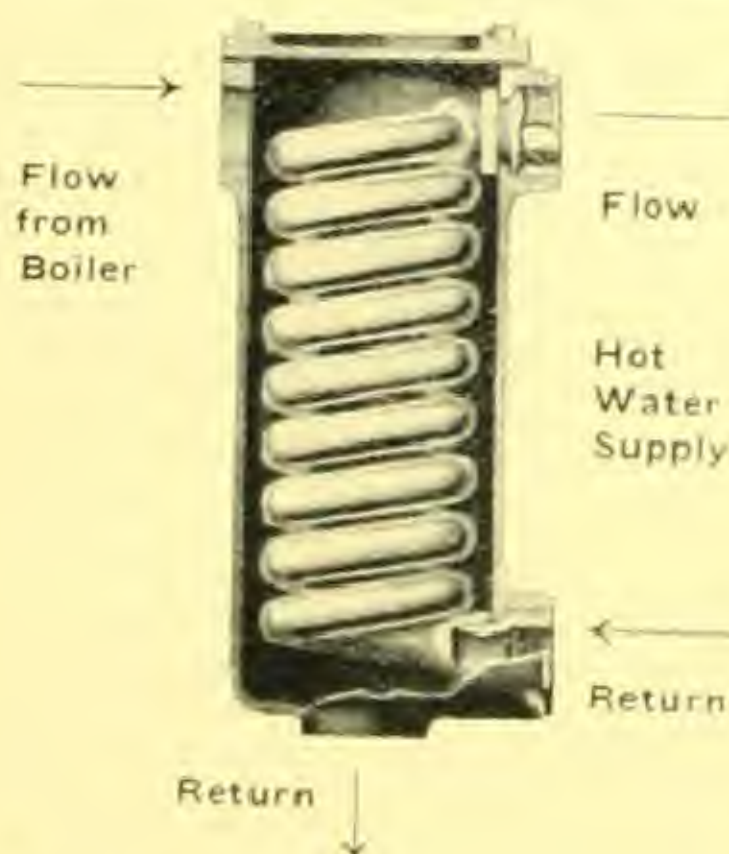
Phantom View Indicating Flow.

## Control

May be controlled manually or by an ordinary switch or automatically. When used with an oil burner it may be connected in multiple with the oil burner motor to start and stop with the burner.

## Sizes

Type	Pipe Size.	Motor H.P.	Capacity (Gals. per min.)	Weight.	Head.
(For Heating Systems)					
H1½	1½ in.	¼	13	50	1½ ft.
H2	2 in.	1/6	20	60	1½ ft.
H3	3 in.	¼	32	80	1½ ft.
(For Domestic Hot Water Supply)					
H1½	1½ in.	1/6	13	53	1½ ft.
H2	2 in.	¼	20	65	1½ ft.



## EXCELSON WATER HEATER

## Hot Water at Lowest Possible Cost

Excelso Water Heaters furnish a constant and uniform supply of domestic hot water for lowest known cost in homes, apartments, hotels, and offices. They use the fire in the boiler or furnace to save the care and cost of a separate water heater; connect with regular piping and storage tank. Self-operating. Any plumber or steamfitter can install easily and quickly.

## Copper Coil Heating Elements

Excelso Indirect Water Heaters have a copper coil heating element fitting into the cast-iron shell by means of patented ground joint brass connections—all parts interchangeable.

## Types and Sizes

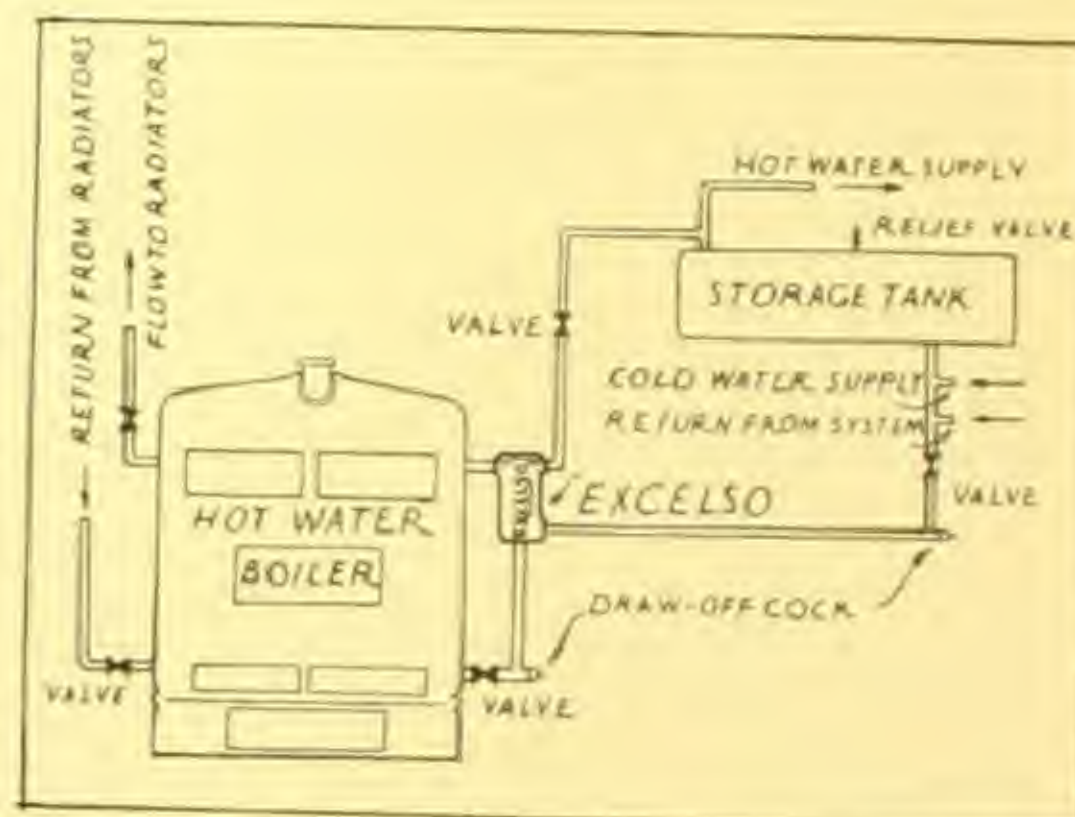
(a) Single Copper Coil Indirect Heater for homes and small buildings.

Size.	3r	11	12	13	14	15
Length	8½	10½	11	11½	15	19½
Diameter	5	5	5	6½	6½	6½
Shell Openings	1	1	1	1½	1½	1½
Coil Openings	1	1	1	1	1	1
Weight, crated	11	17	23	31	39	46
Cap. below water line	30	35	45	60	90	120
Cap. with live steam at 5 lb. pressure	15	30	75	100	150	200

(b) Double Copper Coil Heater for larger installation, such as apartment houses, medium-size hospitals, offices, etc.

Size.	25	26	27	28
Length	12½	15	19	23½
Diameter	8	9	9	9
Shell Openings	2	2	2	2
Coil Openings	1½	1½	1½	1½
Weight, crated	58	68	82	95
Cap. below water line	160	200	300	400
Cap. with live steam at 5 lb. pressure	250	300	450	600

(c) Triple Copper Coil Heater is designed for still larger installations, as laundry, hotels, etc. Also used in heating radiation.





MAJOR

# MAJOR FURNACE & COMBUSTION ENGINEERING Co.

114-116 TOORAK ROAD, SOUTH YARRA, S.E.1, VICTORIA  
Telephone: Windsor 1111.

## Interstate Engineer-Representatives:

S.A.—Pascoe & Co., Grenfell St., Adelaide.  
N.S.W.—Sears Heating & Ventilating Co.,  
Sydney.  
Q'LAND.—Evans Deakin & Co., Brisbane.

W.A.—Saunders & Stuart Pty. Ltd., Perth.  
TAS.—Salisbury's Foundry Co. Pty. Ltd.,  
Launceston.  
TAS.—R. L. Ditcham, Collins St., Hobart.

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S.A.A. File No.

## Products and Services

Patented Low-Pressure Air Fuel Oil Burners—rotary atomizing types, capacities ranging between  $\frac{1}{2}$  and 60 gallons per hour, and non-rotary types  $\frac{1}{16}$  to 8 gallons per hour. Fully automatic Fuel Oil Burners, self-generating steam atomizing Fuel Oil Burners for portable plant, Oil Burning Torches, Direct-coupled Motor Blowers, also Belt-drive Blowers and Pumping Sets for Oil Burners, and a comprehensive range of Oil-burning Accessories.

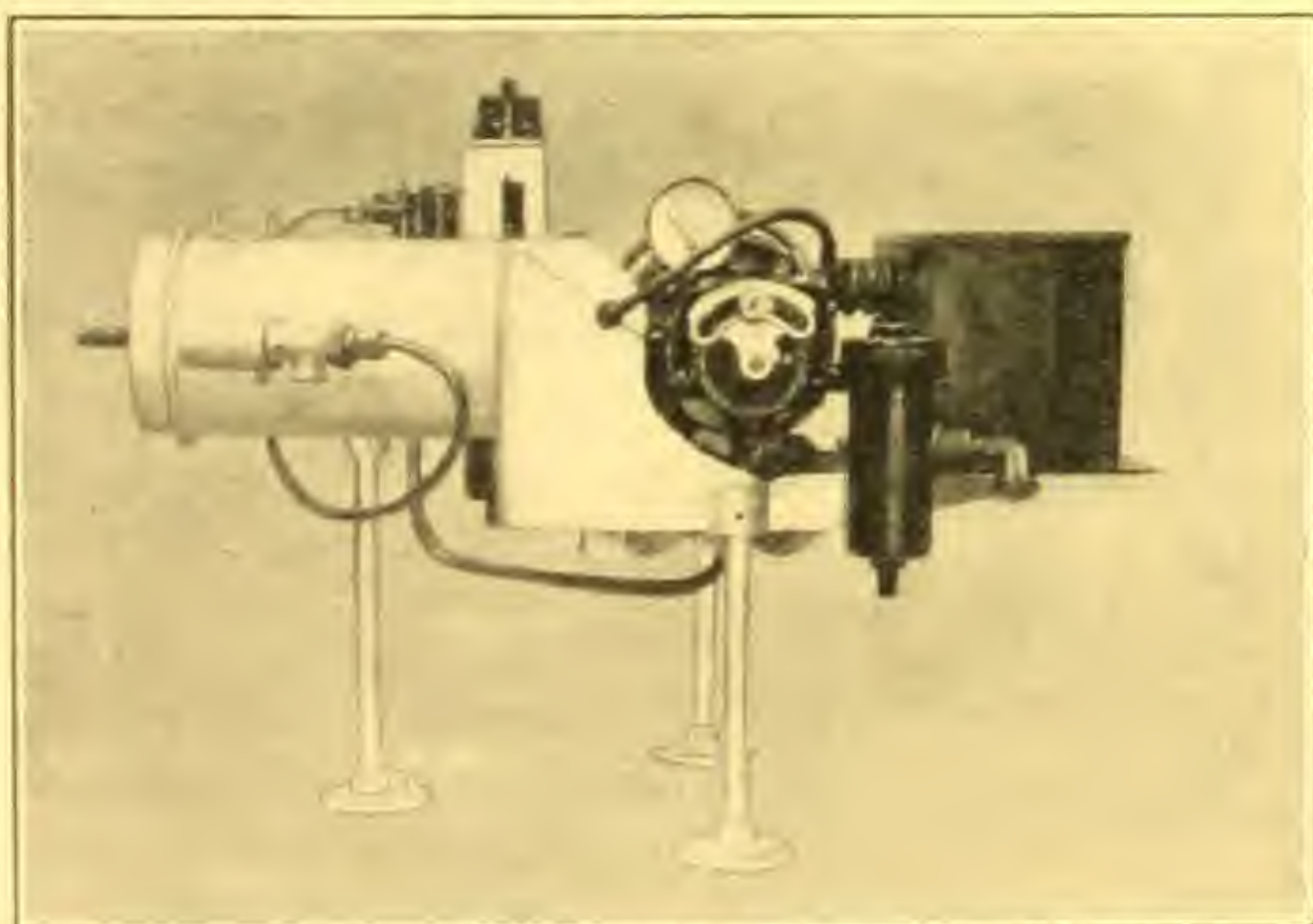
Industrial Furnaces of all types for all fuels. Producer Gas Plants, Automatic and Thermostatic Furnace Controls, etc.; complete Oil Burning Systems designed, manufactured and installed for firing steam and hot-water boilers, kilns, dehydrators, roasters, dryers, ovens of all types, cooking ranges, etc., etc. Experimental work conducted for clients on any new industrial heating problem and plant designed and constructed accordingly under definite guarantee.

## Manufacturing Facilities

The Major Furnace and Combustion Engineering Co. has a complete up-to-date plant for the manufacture under the one establishment of all its specialties. Trained and highly-skilled workmanship is employed throughout, and first-class materials only are used.

## Central Heating—Automatic Fuel Oil Burners

The Major Patent Fully Automatic Fuel Oil Burner is available in three standard sizes. The normal capacities respectively when used on boiler installations being 3, 6, and 12 gallons per hour. Burners of greater capacity could be supplied if required.



The "Major" Model "O" Automatic Burner.  
Capacity:  $\frac{1}{2}$  to 3 Gals. per Hour.

## General Description

The Major Patent Automatic Burner is of the low-pressure air, whirling spray, atomizing type, using air at 1 to 3 lbs. per sq. inch pressure. The atomizing air is supplied by a small positive rotary blower direct coupled



A "Major" Model 2 Automatic Burner Installed.

to an electric motor. The oil is fed by a rotary oil pump forming an integral part of the unit. This pump is of the positive metering type, the oil feed being adjustable according to the demand.

The unique control which forms part of the assembly is actuated pneumatically by the action of the blower and performs the functions of ignition control and safety shut off. All electrical connections are centred in one terminal box, which encloses the ignition and safety control switches. The safety control is a sensitive heat-resisting steel element which is incorporated within the burner at the nozzle and is connected to the automatic controller by a copper pipe line. The presence or absence of flame at the burner nozzle after the plant has started has a direct influence on this control unit which is almost instantaneous in action and the plant immediately shuts down if for any reason ignition of the oil does not occur. Ignition is effected electrically by means of a spark or flame generated by a high tension transformer of exceptionally robust characteristics.

## Equipment

### Model "O," Capacity 3 Gallons per Hour.

Complete equipment comprises:—Single Unit Assembly—Motor, Blower, Oil Pump, Oil Filter, Automatic Switch Gear, Burner, Diaphragm Controlled Air Shutter, Ignition Transformer and Safety Control Heat Element, Stack Draft Regulator also provided.

### Model 1, Capacity 6 Gallons per Hour (2 Units Separate).

Complete equipment comprises:—Motor-operated Unit, including Blower, Oil Pump, Oil Filter and Automatic Switch Gear and separate Burner Unit, with Diaphragm Controlled Air Shutter, Ignition Transformer and Safety Control Heat Element. Stack Draft Regulator also provided.

### Model 2, Capacity 12 Gallons per Hour (2 Units Separate).

Complete Equipment comprises:—Motor-operated Unit, including Blower, Oil Pump, Oil Filter and Automatic Switch Gear and separate Burner Unit, with Diaphragm Controlled Air Shutter, Ignition Transformer, and Safety Control Heat Element. Stack Draft Regulator also provided.

(Continued on next page)



## MAJOR PATENTED LOW PRESSURE OIL BURNERS

## Rotary Type.

In the development of the "Major" Patent Low Air Pressure Rotary Atomizing Type Fuel Oil Burner, which has involved research work extending over a number of years, the desirability of a constant air-fuel ratio and flame characteristic and the absolute necessity for the ability to produce and maintain a misty atomization of the oil fuel, has been fulfilled, not only for high outputs, but over the whole working range of the burner to a minimum almost on the point of cut off. This achievement, together with the easy and precise control which is incorporated in the "Major" Rotary Burner, means perfect combustion at any working temperature and a stability that allows any desired furnace atmosphere to be held without variation indefinitely.

The Burner is carried on a special swing arm mounting, whilst no portion of the burner enters the firing chamber. Mechanical wear in long continuous service is negligible. As with other "Major" products, the "Major" Patent Rotary Burner is a high-class engineering accomplishment, scientifically evolved, and proved for dependable and efficient service. Sizes range to 60 gallons per hour capacity.

Refer to tables for capacities of various sizes.



The "Major" Rotary Burner, with Swing Arm Mounting.

## Non-Rotary Type.

The "Major" Patent Non-Rotary Burner has been developed to fulfil the requirement for a lower-priced production as compared with the "Rotary," and whilst the performance of the Non-Rotary does not approach the high degree of perfection that characterizes the "Rotary," it nevertheless is a remarkably efficient Burner, and may be used wherever the extremely fine and flexible control of the "Rotary" type is not essential and where the fuel capacity of the burner does not require to exceed four gallons per hour without secondary air, or eight gallons per hour with air induced by stack draft. For example, this type of Burner finds its application with certain classes of heat treatment and metal melting furnaces, porcelain furnaces, pottery kilns, etc., also boilers up to 20 h.p., or 200 square feet heating surface. In applying the "Major" Non-Rotary Burner, a fixed bracket mounting only is necessary, but, if desired, a swing arm mounting can be supplied for the larger sizes. Although the "Major" Non-Rotary Burner has been evolved to enter into price competition with other low-priced oil burners, the exclusive air control is such that the flame velocity always remains constant, whilst the micrometer oil valve assures such close regulation as cannot be obtained with commercial needle valves. Sizes range to eight gallons per hour capacity.

Refer to tables for capacities of various sizes.

## Capacity Tables

APPROXIMATE CAPACITIES OF "MAJOR" LOW PRESSURE OIL BURNERS  
(AIR PRESSURE 7in. to 10in. WATER COLUMN)

Burner Size and Type.	MAXIMUM CAPACITY PER HOUR.			
	Without secondary air supply. (Furn. work with slight back pressure)	With secondary air moderate draught (Boiler work) 1/10in. water column in firebox	With secondary air good draught (Boiler work) 1/2in. water column in firebox	Minimum gallons per hour
2 1/2 in. Rotary (1 1/2 in. Noz.)	3 1/2 gals.	7 gals.	14 gals.	3/4 gal.
3 1/2 in. Rotary (2 1/2 in. Noz.)	7 gals.	14 gals.	28 gals.	1 1/2 gals.
5 in. Rotary (3 1/2 in. Noz.)	14 gals.	28 gals.	56 gals.	3 gals.
"Midget" Non - Rotary (1/2 in. Noz.)	3 1/2 pints	1 gal.	1 gal.	1/2 pint
"Midget" Non - Rotary (3/4 in. Noz.)	7 pints	2 gals.	2 gals.	1 pint
2 in. Non-Rotary (1 1/2 in. Noz.)	1 1/2 gals.	4 gals.	4 gals.	1/2 gal.
2 1/2 in. Non-Rotary (1 1/2 in. Noz.)	3 1/2 gals.	8 gals.	8 gals.	1 gal.

REPRESENTATIVE INSTALLATIONS  
(Partial List)

## ENGINEERING USERS

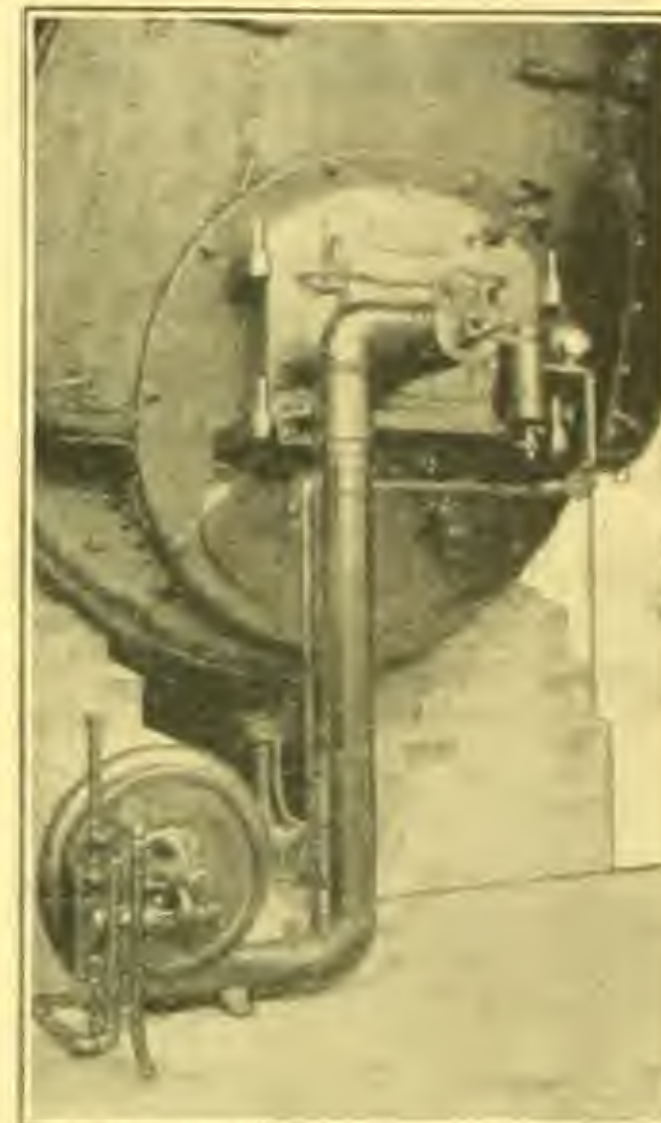
The Victorian Railways (Newport Workshops).  
The South Australian Railways (Islington Workshops).  
The Commonwealth Railways (Port Augusta Workshops).  
The Tasmanian Government Railways Workshops, Launceston.  
Broken Hill Associated Smelters.  
Thompsons Engineering & Pipe Co. Ltd.  
Perry Engineering Co., Adelaide.  
Sonnerdale Ltd., Sydney.  
Richardson Gears Pty. Ltd., Footscray.  
Australian Spark Plug Co., S. Melbourne.

## BOILER FIRING

William Lawrence (Globe Dye Works) Pty. Ltd., Prahran.  
Luton Dye Works, St. Kilda.  
Federal Steam Laundry, Brunswick.  
Eye & Ear Hospital, Melbourne.  
Gilbey, W. & A., Ltd. (Distilleries), West Melbourne.  
Heda Electrics Pty. Ltd., North Prahran.  
Michell & Co., Hindmarsh, S.A.  
Beaurepaire Tyre Service, Melbourne, Ballarat, Bendigo, Geelong.  
Wooroloo Sanatorium, W.A.

## MISCELLANEOUS

Wunderlich Ltd., Brunswick and Sunshine, Victoria—Tile Kiln and Faience Kiln.  
Collingwood City Council—Bitumen Plant and Stone Dryer.  
Victorian Country Roads Board—Traveling Bitumen Heaters.  
Sargents Ltd., Sydney—Scotch & Vienna Ovens, Reel Ovens.  
Colonial Sugar Refining Co.—Sugar Char Kilns.  
Troedel & Cooper Pty. Ltd., Printers—Varnished Paper Drying.  
Commonwealth Works (Aviation Depot)—Cooking Ranges.  
Haigh's Chocolates, Adelaide—Confectionery Stoves.  
Rosella Preserving Co., Richmond—Soldering Machine Furnaces, etc.  
Barrett Bros. & Burston, Melbourne—Malt Roasting.



A Typical Boiler Firing Installation with "Major" Low Pressure Air Oil Firing Equipment.



C.O.R.

## COMMONWEALTH OIL REFINERIES LTD.

PROPRIETORS: THE COMMONWEALTH GOVERNMENT AND THE ANGLO-PERSIAN OIL COMPANY LIMITED

Refinery:

KOROROIT CREEK ROAD, WILLIAMSTOWN, VICTORIA

Branch Offices:

VICTORIA: Poolman St., Port Melbourne.  
SYDNEY METROPOLITAN AREA: 117 Pitt  
St., Sydney.

Selling Agents:

N.S.W. (Excluding Sydney): Dalgety & Co. Ltd.  
S.A.: Dalgety & Co. Ltd.  
QUEENSLAND: Dalgety & Co. Ltd.

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S.A.A. File No.

## HISTORY AND EXTENT OF HEATING WITH FUEL OIL

It might well be said that the opening of the twentieth century marked the beginning of the "Oil Age." Previously, little was known of the value of oil as a fuel, coal having at that time a monopoly.

Oil is now being used in practically every industry and wherever power is generated. Transport is largely dependent on it; and where efficiency and cleanliness are essential, oil has ousted every other form of fuel.

In their designs for Residential, Commercial and Institutional buildings, Architects are incorporating central heating with oil as a boiler fuel. Increased efficiency, ease of control, freedom from dust and ashes, with a consequent reduction of Fire Risk, and the low cost of upkeep, are among the advantages of the oil-fired boiler. Thermostatically controlled, the amount of supervision necessary is reduced to a minimum;

and, with the oil burner once set, the plant may be left for hours without attention, with the assurance that the desired temperature will be maintained.

C.O.R. Fuel Oil is obtained by the distillation of a high-grade Persian crude oil, with a paraffin base. It is refined at Laverton, Victoria, the well-known C.O.R. brands of Motor Spirit and Kerosene being produced at the same time. C.O.R. Fuel Oil is suitable for furnace or for engines of the Diesel type.



C.O.R. Refinery at Laverton, Victoria.

The Specification is:—

Specific Gravity @ 60°F.: .897.

Flash Point: 175°F.

Viscosity @ 75°F., Redwood: 195 secs.

Viscosity @ 100°F., Redwood: 92 secs.

Viscosity @ 140°F., Redwood: 55 secs.

Flow Point: 35°F.

Calorific Value: 19,500 B.T.U.s.

Asphalt Content: 1.5%.

Sulphur Content: 1.1%.

## Requirements of Atomization

The success of Oil as a fuel is due to the fact that it is easily atomized and enters the combustion chamber in the form of vapour. The construction of the burner nozzle is such that a whirling movement is given to this vapour as it leaves the burner. This movement aids the mixture of oil and air so necessary to perfect combustion. Atomization is obtained in various ways. With the pressure burner the oil is forced through a fine orifice at from 10 lbs. to 60 lbs. pressure. With the steam burner the oil is forced through the burner orifice by gravity and a jet of steam atomizes the oil after it passes through the burner nozzle. Perfect atomization and the correct air mixture will give perfect combustion.

The absence of smoke at the stack is not evidence of perfect combustion, as it is possible to have smokeless combustion with an over supply of air. Although no smoke is visible, heat is being generated more rapidly than it can be absorbed, and the result is an increase in smoke-stack temperatures with a corresponding loss.

A light grey haze at the stack is evidence that the air supply is economically adjusted.

## Table of Comparative Calorific Values of C.O.R. Fuel Oil and Other Fuels

Fuel	Calorific Value B.T.U. per lb.
C.O.R. FUEL OIL . . . . .	19,500
N.S.W. COAL . . . . .	12,500
BRIQUETTES . . . . .	9,000
HARDWOOD (BOX) . . . . .	8,000
COKE . . . . .	11,000
COAL GAS . . . . .	500-600

(Continued on next page)

RAMSAY'S CATALOGUE



## Fuel Oil Installation

### STRUCTURAL REQUIREMENTS

So small and compact is the modern Fuel Oil Burner Unit, that it is not necessary to make special provision for the housing of the set. The amount of space usually allotted to a coal-fired boiler is more than sufficient to accommodate the unit and leave ample room for inspection and overhaul.

### ELECTRICAL WORK

The motor which drives the set is usually of  $\frac{1}{2}$  or  $\frac{3}{4}$  h.p., according to the size of the unit which it is necessary to install. Where thermostatically controlled, the wiring to the switch location will have to be provided for.

### OIL STORAGE

The oil is stored in underground tanks of from 200 to 5,000 gallon capacity. Tanks of 1,500 gallons capacity are very suitable to the average installation, as they do not require frequent filling, and the excavation necessary for their reception is comparatively small.

### FIRE UNDERWRITERS' REGULATIONS FOR STORAGE OF FUEL OIL

The Fire Underwriters' Regulations for the Storage of Fuel Oil must be complied with. These regulations include the following:—

"No liquid having a flashpoint below 150 deg. F. (closed test) shall be used or mixed with Liquid Fuel."

"Tanks shall be constructed of Wrought Iron or Mild Steel of a minimum gauge as follows:—

1 to 250 gallons	16 gauge
251 to 500 "	14 "
501 to 1,000 "	12 "
1,001 to 3,000 "	7 "
3,001 to 5,000 "	$\frac{1}{2}$ inch

"The capacity of any individual tank not to exceed 5,000 gallons."

"Tanks must be filled from outside the building only through oil-tight pipes with screw caps or valves."

"Underground tanks to be covered by earth at least 2 ft. thick, or by earth at least 12 in. thick, with reinforced concrete thereon."

"A vent pipe of at least 1 in. and not exceeding 2 in. diameter carried to the open air and suitably protected by two brass wire diaphragms having not less than 900 meshes to the square inch to be fitted."

"All tanks must be electrically earthed."

## Oil Delivery Facilities

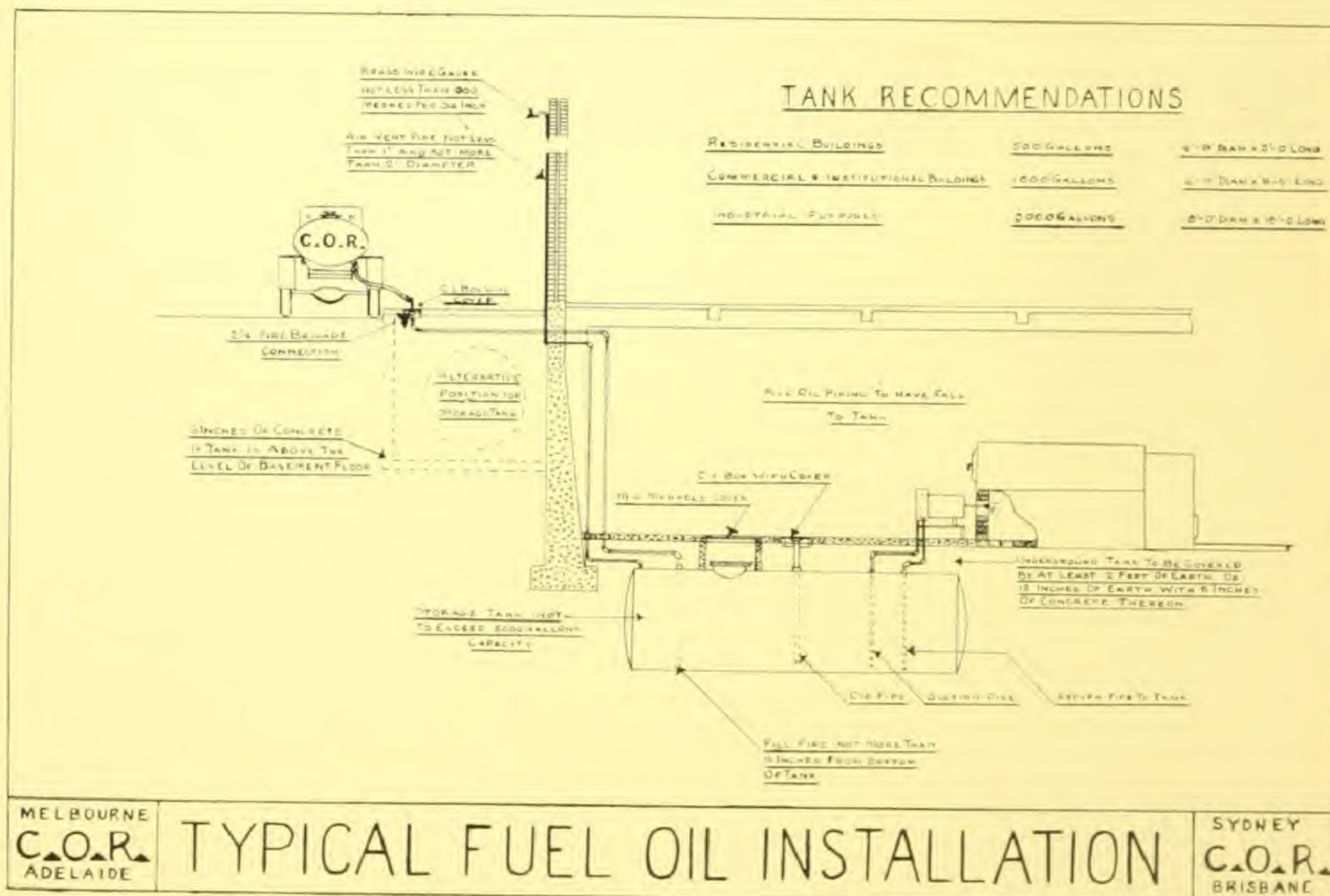
The Commonwealth Oil Refineries Limited have a fleet of well-equipped motor vehicles of 1,000 gallons and 1,500 gallons capacity for the delivery of Fuel Oil. These vehicles are fitted with Power Pumps, so the filling of underground tanks can be carried out speedily and without spillage.

## Representative Users of C.O.R. Fuel Oil in Melbourne

Capitol Theatre.  
Chancery House.  
Commercial Travellers' Club.  
Royal Automobile Club.  
A.M.P. Society.  
Temple Court.

## Advisory Service to Architects

The Commonwealth Oil Refineries Limited will be pleased to place the services of their Fuel Oil expert at the disposal of architects to help to solve the problems of location and layout of Fuel Oil Installations.







## THE SHELL COMPANY OF AUSTRALIA LTD.

### AUSTRALIAN HEAD OFFICE:

Shell Corner, Bourke and William Streets,  
Melbourne.

### NEW ZEALAND HEAD OFFICE:

The Shell Co. of New Zealand Ltd., A.M.P.  
Buildings, Corner Hunter Street and  
Custom House Quay, Wellington.

### BRANCH OFFICES:

Worando Building, 91 Grenfell St., Adelaide.

Lawson House, 49 Clarence St., Sydney.

133-135 Mary St., Brisbane.

Alliance Building, 96 St. George's Terrace,  
Perth.

15a Elizabeth St., Hobart.

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S.A.A. File No.

[For Other Products, See Page 69]

## FUEL OIL FOR CENTRAL HEATING

### A New Era in Central Heating

Architects and Heating Engineers in Australia have been quick to recognise the great advantages of Fuel Oil, and Oil-Fired Central Heating is now invariably specified for large new buildings, while increasing numbers of coke and coal fired boilers are being converted to burn oil.

### Heating Plants

In so far as the disposition of pipes and radiators is concerned, there are many systems for heating buildings.

Whichever system is employed, the heating units are usually connected to a central boiler plant, which may be either the hot water or the low-pressure steam type. Hot water systems may be of the natural circulation type, or the circulation may be assisted by a booster pump. In some cases, several boilers are employed; some of these are for hot water only, and some for low-pressure steam. In every instance, however, an efficient oil-burning system can be installed without interfering in any way with the existing pipes and radiators. Attention is drawn to the development of the fully automatic, oil-burning, central heating plant, capable of operating, unattended, by day or night, throughout the winter. A small instrument, known as a thermostat, fixed in a convenient position in the house, and set by hand to the desired temperature, automatically maintains that temperature through all changes of weather.

These automatic and highly economical plants, eminently suitable for private residences, are being installed in large numbers, and users testify to their remarkable efficiency and reliability.

### ADVANTAGES OF OIL FIRING

#### Cleanliness

The boiler-room need be no longer a place of gloom and dirt, for oil has been aptly described as an invisible fuel, and, moreover, Fuel Oil contains no ash and can be burned without a trace of smoke. The continual disposal of ashes, flue cleaning, and periodical removal of soot are therefore eliminated. Fuel Oil is delivered invisibly through a pipe into a closed tank, from which it is distributed to the burners invisibly, silently, and without manual labour. Fuel Oil provides a safeguard against damage to stock, effects a tremendous saving in labour, reduces the cleaning staff, and also ensures a cleaner, clearer, and healthier atmosphere throughout the building.

### Safety

The risk of fire is less with liquid than with solid fuel. The reason is that all constituents volatile at ordinary temperature have been eliminated from Fuel Oil, and until it is atomised into fine spray, and thus intimately mixed with air, it is practically non-inflammable. The use of coal or coke always involves the attendant dangers of cinders and sparks, whereas a properly designed, oil-fired boiler, with automatic controls, can be left entirely unattended with complete safety.

### Silence

The clang of clinking tools and rakes, the banging of fire-doors, and the penetrating sounds produced by shovelling coal or coke, carry for very long distances, and are often a source of intense annoyance, whereas a properly designed oil-burning system is practically noiseless. This is an important consideration in hospitals, hotels, schools, and similar institutions.

### Economy

One of the first questions usually asked regarding Oil Firing is: "What is the cost of Fuel Oil as compared with coal or coke?" It must be realised, however, that the cost of coal or coke and the cost of heating with coal or coke are two very different things. Such expense as ash removal, cleaning and painting, renewals of firing tools and fire-bars, and wages of stokers have to be considered, not to mention such intangible items as lack of uniformity in temperature and the value of extra space required for storage. On the other hand, the cost of heating by Fuel Oil ensures cleanliness, comfort, convenience, and complete temperature control, all of which have a very substantial value. It will be seen, therefore, that in reckoning up the total cost of heating a building, a great many factors must be taken into account in addition to the price of fuel. The prices of both Fuel Oil and solid fuels vary in different parts of the country, but with Fuel Oil a lower cost of operation usually results. The following points should be remembered:—

- (1) Coal and coke vary considerably in quality as well as in price, but Fuel Oil has a constant calorific value;
- (2) Coal and coke take up valuable space, whereas Fuel Oil can be placed in tanks underground or pumped to overhead tanks;
- (3) Where stokers are employed, no less than 80 per cent. of their time is saved when using Fuel Oil, even on a semi-automatic system. With fully automatic burners, the amount of attention required is negligible.

(Continued on next page)

RAMSAY'S CATALOGUE



T. & G. BUILDING, MELBOURNE.  
Central-heated with Shell Fuel Oil.



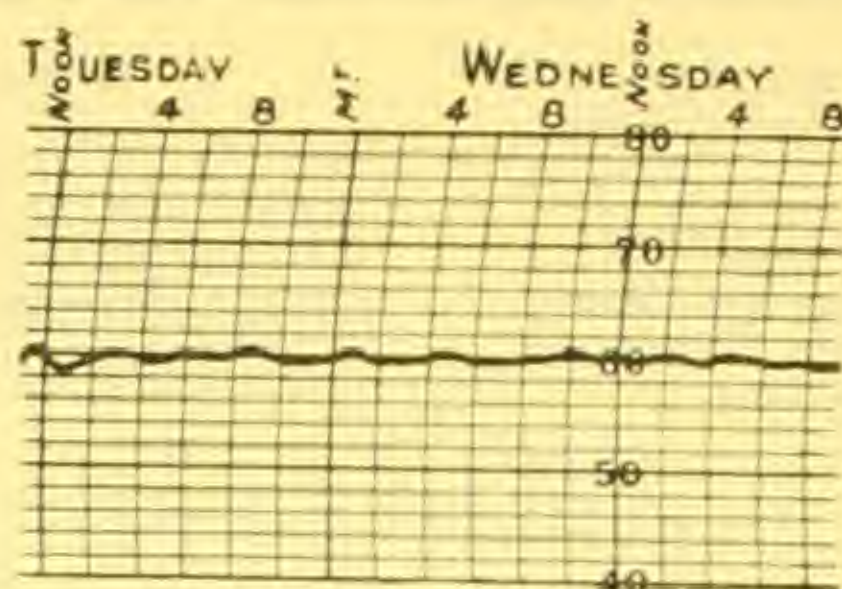
### Increased Efficiency and Heat Control

The test of the efficiency of a Central Heating Installation is obviously that a desired temperature shall be maintained throughout the building, irrespective of outside conditions, with a minimum consumption of fuel. With solid fuel, which is applied intermittently, it is impossible to meet the fluctuations in external temperature. The result is that extreme coldness in the morning is often followed by over-heating and stuffiness in the afternoon, due to the stokers trying to combat the prevailing conditions. This over-heating, of course, indicates excessive fuel consumption.

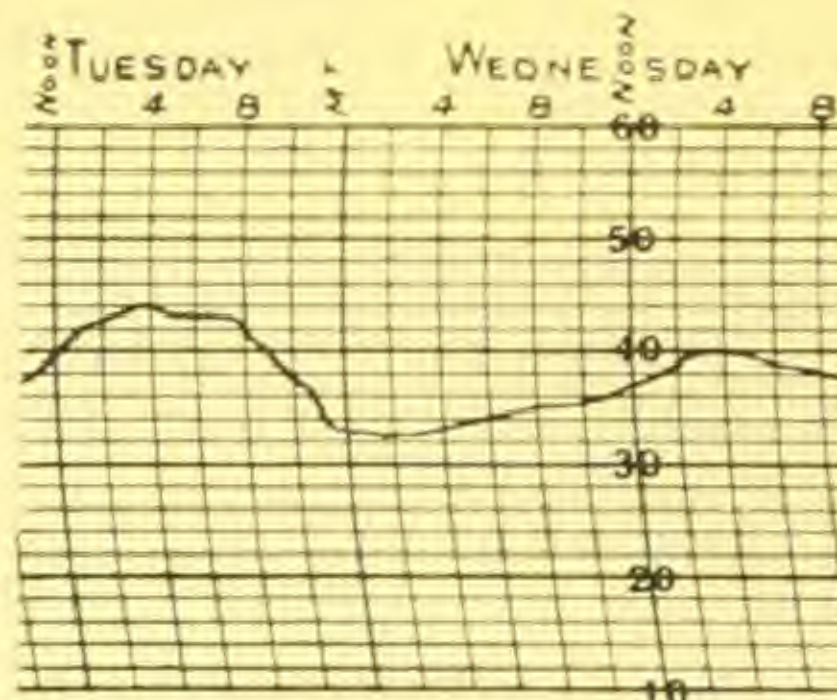
With an oil-burning system the time taken to attain a given temperature from cold is about one-half that taken with solid fuel. With thermostatic or automatic steam-pressure control the supply of oil to the burners is automatically regulated, and the required temperature inside the building is maintained day and night, irrespective of weather changes, with resultant comfort and healthy living conditions. On a cold day, when the difference between the inside and outside temperatures is large, and the demand for hot water is heavier than usual, the unseen but certain action of the thermostat increases the oil flow as much as is necessary, but no more, and under opposite conditions reduces it again. Such action therefore guarantees that maximum efficiency is always obtained with minimum fuel consumption.

Owing to the sudden climatic changes in this country it is often desirable in the spring and autumn to use Central Heating during spells of cold weather. Because of the difficulties attending the starting-up of coal or coke-fired boilers, buildings are often left unheated, but oil burners can be put into operation in a few minutes and heat provided throughout the building in a very short time.

The thermographs shown were recorded in a building fitted with Oil-Fired Central Heating, having thermostatic control. The upper diagram shows the temperature inside the building from noon Tuesday until 8 p.m. Wednesday, and is practically steady at 60 degrees F. The lower diagram shows that the outside temperature varied from 44 degrees F. down to 32 degrees F. during the same period.



TEMPERATURE INSIDE BUILDING



TEMPERATURE OUTSIDE BUILDING

### PLANTS FOR OIL BURNING

#### 1. Completely Automatic Plants

The most up-to-date plants comprise a complete single-boiler burner unit, incorporating in one compact whole, burner, electric motor, fan and oil pump, fitted directly on to the boiler front. This arrangement in the best type of plants includes a very carefully planned series of automatic controls which start and stop the burner whenever necessary. These plants are equipped with electric ignition and are usually controlled by a thermostat placed in one of the rooms of the building. When a certain temperature is reached the thermostat operates a switch which shuts the burner down completely. After the lapse of a certain time, when the room has cooled to one or two degrees below the required temperature, the switch is automatically reversed, the burner started, and the mixture of oil spray and air mechanically ignited. Safety controls ensure that, should the burner fail to light for any reason, a thermostat in the flue or on the boiler front comes into action and automatically shuts off the oil supply.

A fully automatic burner of this kind will operate on Shell Fuel Oil without any necessity for preheating the oil, and will continue to run, under ordinary conditions, without attention. In fact, many of these burners are left in action unattended day and night continuously for prolonged periods. In normal cases, an automatic plant will only burn oil and use current for about six to eight hours out of the twenty-four, thus giving highly economical working conditions and a uniform heating effect. A large number of these self-starting, self-stopping, self-lighting, and self-extinguishing plants have now been fitted in various buildings throughout Australia and New Zealand, and the Shell Company will be pleased to make arrangements for any prospective user to view one in operation if application is made to the nearest Branch office. This type of burner is particularly suitable for hospitals, private residences, green-houses, and, in fact, for any type of boiler plant where continuous running is desired.



Central Heating assures the same desirable temperature conditions in the Bathroom as in other portions of the home.



Automatic Plant installed at Shell Corner, Melbourne.



## 2. Semi-Automatic and Hand-Controlled Plants

### (a) High-Pressure Air Atomisation.

The oil burner (similar to that used in high-pressure steam-boiler practice with steam) operates with compressed air for atomising at about 10 lbs. or more per square inch. The Fuel Oil is fed by gravity from an overhead service tank, and the air for atomisation is fed from some source of compressed air already available, or from a small motor-driven compressor specially installed, through piping to the burners. Although this system may be looked upon as possibly the earliest, and



Central Heating with Shell Fuel Oil provides warmth and comfort for this Melbourne home.

in some respects the simplest, it gives quite satisfactory results. The description above is of a Hand-Controlled Installation, but automatic regulators can be applied in exactly the same manner as to other types of plant. The following would be necessary:—(a) An automatic valve on the oil line to shut off oil if compressed air supply fails; (b) Thermostatic control of the oil supply, operated by the temperature of the water; (c) Thermostatic control operated by the flue or furnace shutting off the oil completely if the flame should be extinguished. The actual burners working on this system are of many distinctive types.

### (b) Medium-Pressure Air Atomisation.

Although a separate subdivision is given to this type, the arrangement is to all intents and purposes the same as under Section (a). The only difference is in the machine supplying atomising air. A rotary positive blower is used instead of a reciprocating piston compressor. Even here the line of demarcation is difficult, since there is at least one type of rotary positive blower which can produce 10 lbs. or more pressure per square inch. Generally, however, the positive blower is used for pressures from 3 to 5 lbs. per square inch. Such machines are frequently employed because they are considerably cheaper for a given output than the reciprocating types, and will run as noiselessly as a well-designed, low-pressure fan. The automatic controls required are as given under Section (a).

### (c) Low-Pressure Air Atomisation.

This system is also characterised chiefly by the type of machine used for supplying atomising air. The term "low-pressure" is usually applied to the range between 10 inches and 24 inches of water gauge, a pressure which is generally best obtained from a fan or turbo-compressor. The automatic controls are as for the two previous sections, and the low-pressure burner is probably the most effective, and therefore the most popular, for Central Heating purposes.

## 3. Hand-Controlled Plants

### Mechanical Atomisation.

Until recently little prominence had been given to this very important method of atomisation in connection with Central Heating plants, since it has been regarded in the past as an industrial burner system used almost exclusively for large steam boilers. It is, in fact, the burner used on nearly all marine boilers and large industrial steam-raising plants. The pressure jet burner is widely used on batteries of steam boilers in large public and commercial buildings, hospitals, residential flats, and hotels.

As usually arranged, these large plants are not automatically controlled, since a stoker has to be on duty for other reasons. Regulation, however, is extremely simple, and one man can easily attend to six or more boilers in one battery; the occasional adjustment of the oil-pressure valve, or air controls on the boiler fronts, being all that is required.

## COOKING RANGES

The desire to find relief from the conditions attendant upon the use of coal or wood was responsible for the introduction and development of the use of gas in cooking equipment, and it was soon widely adopted in small plants.

Large baking establishments, hotels, or restaurants requiring a large amount of heat over long periods found that the use of gas, because of its high cost, was almost prohibitive; for economical reasons they have been compelled to continue the use of coal, wood or coke.

With the comparatively late and widespread use of oil as a fuel a new era has come in for cooking and baking equipment, as one may obtain all the advantages of gas, with a large saving in operating costs. A comparison on a thermal basis shows that approximately three gallons of heavy fuel oil produces as much heat as a thousand cubic feet of average city gas, and at less than one-fourth the cost. Beyond very low operating cost and cleanliness, the use of oil has many other advantages over solid fuels, e.g.:—

- (1) Flexible operation—large or small fire upon demand;
- (2) Better and more uniform heating of tops and ovens;
- (3) Saving in cooking time, as fire can be brought to maximum immediately upon starting;
- (4) Eliminating necessity of early rising of attendants to build fires in the morning;
- (5) Saving of labour in attending and cleaning of fires and removal of ashes;
- (6) Permitting storage of fuel outside building and the piping of same to kitchen without manual labour;
- (7) No fuel is required when not in actual operation.



Fuel Oil Burners applied to standard ranges at Cliveden Mansions, East Melbourne.

(Continued on next page)



### Oil Delivery Facilities and Storage Arrangements

Fuel Oil is distributed in bulk from the Shell Installations by road tank waggon which are specially equipped with powerful air compressors or pumps, which are capable of transferring the contents of the tanks into customers' storage with a minimum of inconvenience and delay.

For every oil-fired Central Heating installation a main Fuel Oil storage tank is required, and it is desirable to have the storage tank big enough to hold a quantity which will permit of a full tank waggon load (approximately 1000 gallons) being taken at each delivery, thus assuring purchase of oil at the minimum rate. Before arranging tankage it is suggested that advice as to size be obtained from the Shell Company.

In the case of Fuel Oil burning plants fitted with pumps, and therefore not requiring gravity feed, the storage tanks can often be placed in existing basements or cellars below ground. Storage tanks can be either rectangular or

cylindrical. All tanks should have a proper vent pipe fitted. It is also advisable to have a drain cock fitted on the bottom of the tank so that the tank can be completely drained if necessary. This is distinct from the pump suction connection for the burner supply.

It is generally desirable to have sufficient capacity of catchpit, or equivalent, surrounding the tank, so that in the event of an overflow the oil does not escape beyond the vicinity of the tank itself.

### Advisory Service to Architects

The Shell Company does not supply oil-burning plants, and has no financial interest in the manufacture of such plants. A special Fuel Oil Department is maintained at each Branch Office for the purpose of advising interested parties on the selection of the most suitable type of equipment for each individual requirement, and enquiries are welcomed.

## SPECIFICATION FOR INSTALLATION OF OIL-BURNING EQUIPMENT

### SCOPE OF CONTRACT

This specification comprises the supply and installation of a fuel oil burner with accessories and oil tankage for service on a ..... boiler installed at .....

The equipment is to comprise a Model ..... fuel oil burner with all necessary boiler and safety controls, fuel oil storage tank, all necessary piping, fittings and valves, electrical wiring and switches back to main or sub-switch board, but not including main or sub-switch board. All necessary refractory linings are to be installed to the boiler and combustion chamber. The whole apparatus is to be tested and adjusted ready for service and complete in every detail.

The installation shall strictly comply with the latest rules and regulations applying to the use and storage of liquid fuel issued by the Fire Underwriters Association of ..... and with any Government or Municipal regulations which apply. The installation shall have a heating capacity adequate to supply the maximum demand of the boiler as determined by standard boiler practice.

### BURNER

The burner shall be a Model ..... and shall be provided with automatic ignition device which shall be of the following type installed in accordance with the manufacturer's instructions.

- (a) Direct jump spark, electric.
  - (b) Electrically-lit gas flame.
  - (c) Gas flame with small gas pilot.
- (Strike out types not required)

Where gas ignition is used, gas must be automatically turned off or lowered to pilot setting after lighting oil flame.

### COMBUSTION CHAMBER

The combustion chamber of the boiler shall be lined with first quality firebrick laid brick to brick with just sufficient fire cement to fill the interstices. Alternatively, the lining may be constructed of high-grade plastic refractory material of an approved brand.

### CONTROLS

**SAFETY CONTROL.**—The burner shall be fitted with an efficient safety control which will stop the apparatus promptly should ignition be delayed or flame failure occur.

**ROOM THERMOSTAT** (if fitted).—The room thermostat shall be fixed in the ..... room at a height of approximately 5 ft. from the floor in a position which will represent the average room temperature and be away from such disturbing influences as radiators, hot water pipes, doors, windows, etc.

**BOILER CONTROL.**—A (thermally) (pressure) operated boiler control switch shall be installed in accordance with the maker's published instructions. (If a room thermostat is installed, the boiler control switch and room thermostat switch shall be wired in series).

### OIL TANKAGE

The contractor shall supply and install a ..... gallon storage tank. The tank is to be constructed of (wrought iron) (mild steel) of ..... gauge in strict accordance with the specifications contained in the Rules of the Fire Underwriters Association of ..... The tank shall be covered with at least two coats of bituminous paint. The tank shall have separate openings for each of the following connections:—Fill pipe, vent pipe, suction pipe, return pipe and gauge pipe. The tank shall be installed underground so that the top of the tank shall be at least 2 ft. below the level of the lowest floor in the building. The tank must be properly bedded in good clean sand and pipe connections to the tank shall be so arranged that no damage will occur to pipes or connections should the tank settle. The oil storage tank and apparatus shall be electrically earthed and the vent pipe provided and installed in accordance with the Rules of the Fire Underwriters' Association of .....

The oil fill pipe is to be carried to a filling point outside the building and provided with lock cap and cast iron surface box with hinged lid. The fill pipe and dip pipe are to extend into the tank to within 6 in. of the bottom.

### PIPING

All piping shall be of best quality wrought iron, galvanised. All pipe fittings shall be first quality galvanised malleable. Pipe threads shall be cleanly cut and all joints shall be made with litharge and glycerine. On no account shall hemp or other packing be used in making pipe joints. The pipe work shall in all cases be neatly run and, insofar as is practicable, the contractor shall co-operate with the general contractor in the placing of pipes under floors and through walls as the general contract work proceeds.

### WIRING

The electrical wiring shall be run in conduit and installed in strict accordance with the Rules of The Fire Underwriters' Association of ..... and the electric supply authority.

### DAMPERS

No damper or other obstruction shall be allowed in the chimney or connecting flues.

### GENERAL

This specification is deemed to cover all details of supply and installations with the exception that if unusual or unexpected conditions are met with in making the necessary excavations, the contractor shall be reimbursed for such extra work as may be necessary, at labour, material and overhead cost, plus 10 per cent. The contractor shall remove all debris and leave the apparatus and surroundings clean and tidy.

### GUARANTEE AND SERVICE


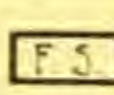
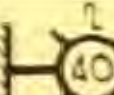


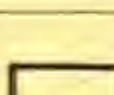
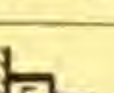

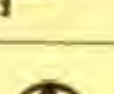
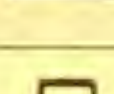
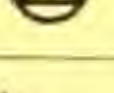

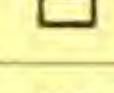
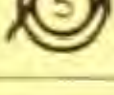
The contractor shall guarantee the whole of the installation against defective material or workmanship for a period of one year from the date of completion. The contractor shall provide free service and inspection of the whole equipment for ..... days from the date of completion.



# SECTION N

[Containing S.A.A. Filing Section No. 31]

## ELECTRICAL WORK

	CEILING OUTLET SEE NOTE 1.		FIRE SWITCH
	BRACKET OUTLET SEE NOTE 1.		MAIN SWITCHBOARD
	FLOOR OUTLET OR JUNCTION BOX FOR PULL IN JOBS		LIGHTING SUB-SWITCHBOARD OR DISTRIBUTION BOARD
	POWER OUTLET ON WALL OR SKIRTING SEE NOTE 2.		POWER SUB-SWITCHBOARD OR DISTRIBUTION BOARD
	SPECIAL OUTLET SEE NOTE 3.		METER
 	LOCAL SWITCHES SEE NOTE 4.		MOTOR OUTLET SEE NOTE 5.
			MOTOR CONTROL PANEL
<p>NOTES:</p> <p>1. NUMERAL IN CIRCLE INDICATES WATTAGE OF LAMPS NUMERAL OUTSIDE INDICATES NUMBER OF LAMPS</p> <p>2. NUMERAL INDICATES AMPERAGE OF CONNECTION</p> <p>3. FOR LIGHTING, COOKING OR HEATING AS MAY BE DESCRIBED IN SPECIFICATION NUMERAL IN TRIANGLE REFERS TO KILOWATTS</p> <p>4. SHOW AS MANY SYMBOLS AS THERE ARE SWITCHES. NUMERAL INDICATES 2-WAY, 3-WAY, ETC. DESCRIBE TYPE OF SWITCH IN THE SPECIFICATION THAT IS, FLUSH, SURFACE OR PULL</p> <p>5. NUMERAL IN CIRCLE REFERS TO MOTOR H.P.</p>			
ELECTRICAL WIRING SYMBOLS			

(Prepared in accord with current practice by the  
Architectural Staff of Ramsay's Catalogue.)



# STATE ELECTRICITY COMMISSION OF VICTORIA

S  
E  
C

31

S.A.A. File No.

Head Office:  
22 WILLIAM STREET, MELBOURNE  
Tel. C.8292 and C.9447

Power Stations:  
YALLOURN — NEWPORT — RICHMOND  
AND GEELONG  
SUGARLOAF — RUBICON (Hydro Stations)

District Undertakings: Tel.  
CASTLEMAINE DIST.: Castlemaine - 238  
EASTERN METRO. DIST.: Dandenong 182  
GEELONG ELEC. SUPPLY: Geelong 1941  
GIPPSLAND DIST.: Traralgon - - - 114  
METRO. ELECTRIC SUPPLY: Cent. 10310  
NORTH-EASTERN DIST.: Benalla - - 276  
WESTERN DIST.: Colac - - - - 246

[For Other Products, See Pages 410, 430, 440]

## History

In 1916 several factors operated in Victoria to direct the attention of Parliament to the advisability of establishing a comprehensive scheme of electricity supply, based on the State's own resources, viz.: that a shortage of electrical energy in the metropolis, involving a serious check to industrial development, was imminent; that, while the existing power houses in the metropolis had reached a stage beyond which expansion was economically impracticable, few, if any, small rural centres had any supply at all; that Victoria was dependent for electrical generation upon imported black coal, and its industries were being frequently disorganised by troubles at the mines and on the waterfront; and that the price of black coal was rapidly increasing. In 1917, an Advisory Committee, appointed by the Government, reported that the brown coal fields of the State offered a much more certain and economical fuel supply for the production of electrical energy than did black coal. In the following year the State Electricity Commission was constituted. The legislation governing its constitution envisaged a comprehensive system of transmitted supply for the State. After surveying the power potentialities of the State, the Commission recommended, as the basis of this system, the erection of a power house at Yallourn, with an initial capacity of 50,000 kilowatts. Parliament approved. The first sod was turned at Yallourn in February, 1921, and the generating, transmitting and receiving facilities were in complete operation in June, 1924.

## Sources of Electrical Energy

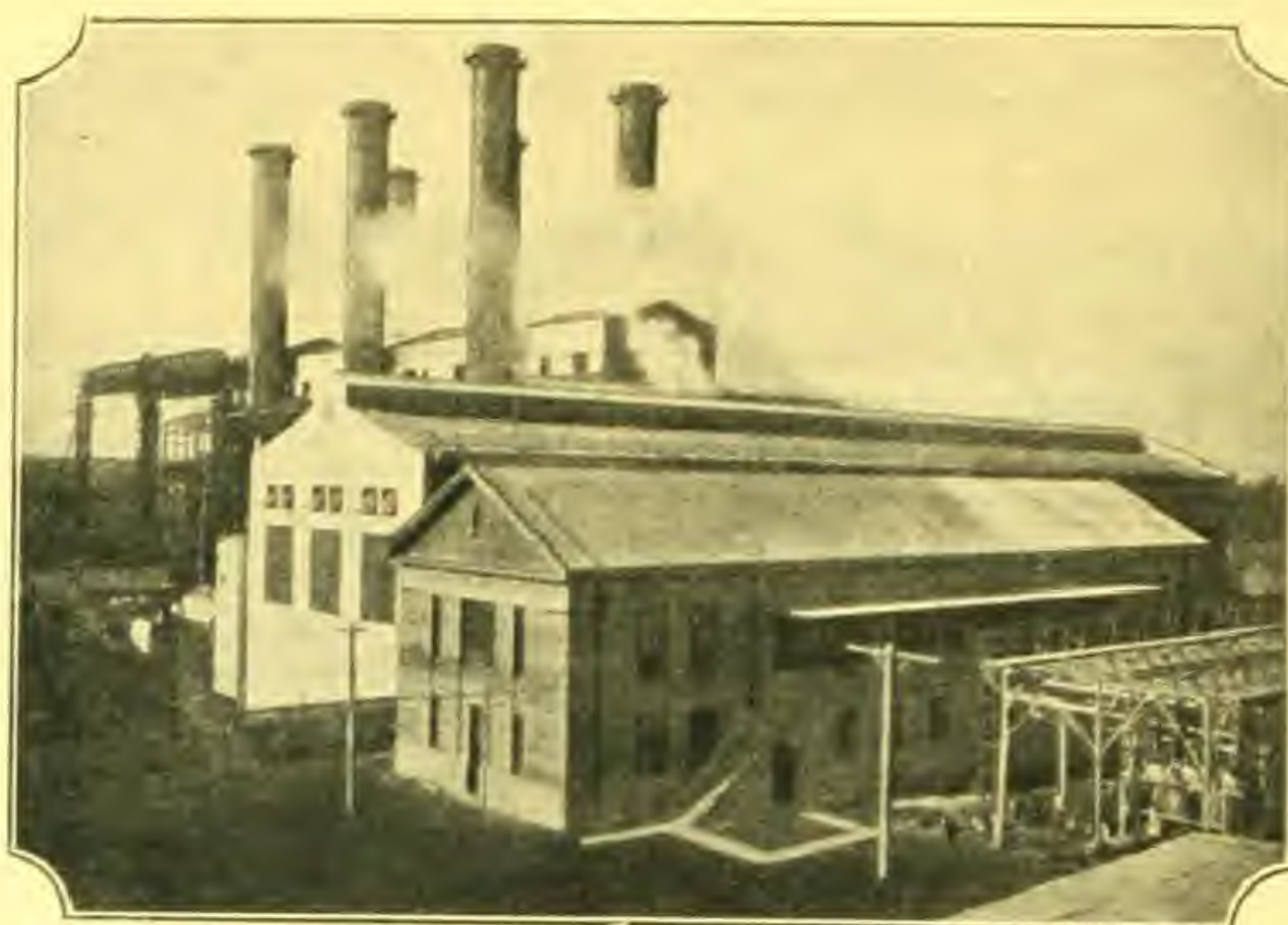
Victoria has unlimited deposits of brown coal capable of being won by the cheap, open-cut method, in which large-scale mechanical processes govern every phase of operations. In the Yallourn area there are 6,000,000,000 tons of open-cut brown coal, averaging 200 feet thick, covered by overburden of an average depth of 50 feet. The coal at present being worked averages 180 feet thick, and the depth of overburden less than 30 feet. The Latrobe Valley, in which Yallourn is situated, is estimated to contain 27,000,000,000 tons of brown coal.

Water power schemes, including the Hume Reservoir, and likely to yield an aggregate of 200,000 horse-power of energy, are within the bounds of practicability when the nature of the demand justifies their serious consideration. Just as the Sugarloaf Reservoir at the junction of the Goulburn and Delatite Rivers, at present provides an economical source of power in conjunction with the Rubicon and Royston Rivers, so it is very probable that at a later date the Hume Reservoir will, on a larger scale, afford a valuable scheme, in conjunction with the Mitta River.

## Functions of the Commission

The functions of the State Electricity Commission may be divided into three broad sections, viz.:—

1. The co-ordination and control of the generation, supply and use of electrical energy throughout the State, embracing the administration of the Electric Light and Power Act.
2. (a) The investigation of possible sources of power;  
(b) The exploitation and development of any such sources of power selected.
3. The encouragement and promotion of the use of electrical energy in every phase of life, rural, domestic, and industrial.



Power House at Yallourn.

## Transmission and Distribution

Three main transmission lines feed from power houses into the receiving stations of the completely inter-linked system. These are the two 132,000-volt lines from Yallourn (one to the Yarraville and the other to the Richmond terminal station), and the 66,000-volt line which brings the hydro-energy from Sugarloaf-Rubicon to Thomastown terminal station. Two peak load stations in the metropolis (Newport "B" and Richmond) feed at 22,000 volts into Richmond and Yarraville. The aggregate capacity of the generating plant (including installations in progress) is roughly 200,000 horse-power. The main points in the metropolitan distribution network are the various major sub-stations, which receive the energy from Yarraville and Richmond at 22,000 volts, for stepping-down and despatch to minor sub-stations, where the pressure is reduced to the supply voltage. The first section of the 66,000-volt ring main which will eventually link Ballarat, Bendigo and Geelong with the system, and consummate it as a complete power scheme for the State, now serves Castlemaine and centres en route. From the 1,500 miles of high-tension transmission lines and the 525 sub-stations which form the basis of the distribution system, supply is given to 178 centres throughout the State, 108 of which had no supply previously. They include many small towns and farming communities.

## The Future

The sufficiency of electric supply in Victoria is guaranteed by the provisions that have been made for meeting all possible demands upon the system until at least the winter of 1934, long before which date the Commission will have perfected its plans for supplying any further increments of loading. The whole scheme is on such a sound technical and financial basis, and the use of electrical energy for all purposes is becoming so universal, that only the most adverse external factors could militate against its progress.

(Continued on next page)



## Work of Standardisation

In the work of co-ordinating and standardising supply, the Commission has acquired and closed down a number of small individual generating stations in various parts of the State, preparatory to making transmitted energy at standard voltage available from its large inter-linked power stations. With regard to all new individual plants authorised in centres at present beyond the economic reach of transmitted energy, uniform standards of construction, system and voltage are provided, so that such centres may be easily connected with transmitted supply at any time, and wherever the Commission has initiated supply, the standard system obtains. It has organised the whole system of electricity supply in Victoria, so that the

growing demand for energy shall be anticipated and provided for in the most economical manner, either by the extension of its existing plants or by the exploitation of new sources of supply.

## Briquettes

Plus the electrical power which brown coal affords, Yallourn briquettes are an important factor in helping to make the State independent of imported fuel supplies. Characteristics of briquettes are their high calorific value, smokelessness, cleanliness, small ash residue, and standardised quality. Continuity of supply and standardised prices are additional advantages, and they are now recognised as the ideal fuel for industrial and household purposes. The factory produces 1200 tons a day.

## ELECTRICITY AS A CONTRIBUTION TO THE ART OF BUILDING

The building of to-day must provide something more than four walls and a roof or merely protection against the elements. Through the medium of electricity it has been possible to embody labour-saving devices and conveniences which make possible many of the most important daily operations of home or business life. It moves workers from the street to the office in a swift and comfortable

manner, provides the correct kind of light for any work in any part of the structure, cools or warms it as may be required, and delivers clean fresh air to the smallest room no matter how far it may be removed from the outside walls. It has revolutionised the home and is the housewife's greatest and most efficient servant.

## ELECTRICITY IN THE HOME

The comfort of a home is generally measured by its convenience, and convenience in these days is in a large part a matter of electrical service. The effectiveness of this service depends on the completeness of the wiring system in the home. Adequate wiring may be installed in new houses at only a small increase in cost over an incomplete or inadequately wired job.

A brief specification of the minimum wiring requirements for the modern home is given in the following schedule:—

Room	Lighting	Power
Hall	One ceiling outlet (two-way switching)	One outlet
Dining Room	One outlet (centre ceiling)	One outlet for each 150 square feet of floor area
Lounge or Living Room	One ceiling outlet if room is nearly square. If length is more than $1\frac{1}{2}$ times the width, two ceiling outlets.	One outlet for each 150 square feet
Breakfast Room	One outlet (centre ceiling)	One outlet
Main Bedroom	One ceiling outlet and one bracket outlet on wall	One outlet
Other Bedrooms	One outlet (ceiling)	One outlet
Bathroom	One ceiling outlet and one bracket outlet on wall	One outlet (connection either for storage hot water system or outlet for bath heater)
Kitchen	One outlet (ceiling)	(a) Outlet for water heater (b) Outlet for 6 kW. range (c) One outlet for appliances (d) One outlet for refrigerator
Laundry	One outlet (ceiling)	One outlet
Front Porch	One outlet	
Back Porch	One outlet	
Garage	One outlet	One outlet

## Notes

1. All power outlets not specified shall be rated at not less than 2000 watts. Plugs for attachment to all power outlets of equal rating shall be interchangeable.
2. In the case of lounge, living, dining, breakfast rooms and kitchen where only one power outlet is to be installed, this outlet should be of the duplex type.
3. When two or more power outlets are to be installed in a room, they should be approximately equally spaced around the perimeter.
4. Provision should be made in the room in which the radio set is to be installed for an approved permanent outlet for supply to the set.
5. The switchboard should be of sufficient size to allow at some future date the installation of—
  - (a) For six-roomed houses and under, one additional lighting circuit and one additional power circuit.
  - (b) For seven-roomed houses and over, one additional lighting and two additional power circuits.
6. The plumbing specification should provide a hose bib for filling a washing machine, and also a drain for emptying it.
7. Lights should be provided in passages, landings, storerooms, pantries and outhouses where the convenience will amply repay the small additional cost.
8. Ample provision should be made for two-way switching of lights in rooms or passages with more than one exit or entrance.
9. Provision should also be made for installation of a bell transformer for operating the electric bell.
10. Ornamental bracket lighting points in dining and lounge rooms add appreciably to the attractiveness of a lighting installation.
11. The installation shall comply in every respect with the Wiring Regulations applicable.

## Service Mains and Meters

Before any provision is made by an architect or builder for the location of service mains and meters, it is recommended that the local electricity supply undertaking should be approached concerning its conditions for the provision and attachment of service mains, and the location of meters.

(Continued on next page)



## LIGHTING

Artificial illumination at its very best is only a small fraction of the daylight intensities to which we are accustomed. An installation which may be referred to as "too bright" or using "too much light" in most cases is really insufficiently diffused light. A bare lamp is not only glaring, etc., but it wastes nearly half of its light in useless directions. Reflectors are used, therefore, to direct the light into useful directions, and also overcome the effect of glare. This glare is objectionable, as it may injure the eyes, and also cause discomfort and fatigue.

A simple method of calculating the required illumination or required wattage by the "lumen" method is given below:

$L$  = lumens required per outlet (for size of lamp refer to table No. 1).

$A$  = area to be lighted.

$F$  = foot-candles required.

$N$  = number of outlets.

$K$  = co-efficiency of utilisation (see table No. 2).

Then  $L = A \times F$

$N \times K$

TABLE 1

Approximate Values of Lumen Output—Gas-filled Lamps—  
200-250 volts.

Watts	60	75	100	150	200	300	500	1000
Total lumens	545	750	1100	1720	2510	3930	7110	16,000

TABLE 2

## UTILISATION CONSTANTS

Allowing 25 per cent. service depreciation to compensate for normal dust and dirt accumulation on lamps and reflector equipment.

Ceiling	Light	Med.	Dark	Light	Med.	Dark	Med.	Dark
Walls	Light	Med.	Dark	Light	Med.	Dark	Med.	Dark
Reflector	Lamp							
RLM Standard Dome	Clear	.49	.47	.45	.48	.46	.44	.44
RLM Standard Dome	Bowl Enam.	.42	.41	.39	.41	.40	.38	.38
Deep Bowl, concentrating	Clear	.41	.39	.37	.39	.38	.37	.37
Reflector Cap	Clear	.35	.34	.32	.34	.33	.31	.31
Diffuser	Clear	.35	.34	.32	.34	.33	.31	.31
Deep Bowl, Glass	Bowl Enam.	.40	.38	.36	.37	.35	.33	.31
Diffusing Enclosing Globe	Clear	.37	.34	.32	.35	.33	.31	.30
Light Opal, Semi-Indirect	Clear	.34	.31	.28	.29	.26	.23	.19
Dense Opal, Semi-Indirect	Clear	.29	.27	.25	.22	.20	.19	.14
Totally Indirect	Clear	.27	.25	.23	.20	.18	.16	.12

This method provides a simple means of checking or estimating an installation, but its use is not recommended in larger semi-indirect or indirect lighting installations where many other factors must be taken into consideration.

TABLE 3

The minimum foot candles to give satisfactory illumination for various types of service is given as under:—

Service	Foot Candles
Automobile Showroom	4.0 - 6.0
Bank (general)	3.0 - 4.0
Billiard Room (general)	1.0 - 1.5
Billiard Table	10.0 - 15.0
Church	2.0 - 3.0
Cinema	1.0 - 2.0
Desk	4.0 - 6.0
Drawing Office	6.0 - 10.0
Factory—	
General	1.0 - 2.0
General, without local illumination	4.0 - 6.0
Local bench	3.0 - 5.0
Local bench (fine work)	5.0 - 10.0
Garage	2.0 - 3.0
Gymnasium	2.0 - 3.0
Hospital—	
Corridors	0.5
Wards (no local illumination)	1.0 - 2.0
Wards (with local illumination)	0.5
Operating table	10.0 - 15.0
Library—	
Reading Room (without local illumination)	3.0 - 4.0
Reading Room (with local illumination)	1.0 - 2.0
Market	1.0 - 1.5
Offices (general)	4.0 - 6.0
Reading (ordinary print)	3.0 - 4.0
Reading (fine print)	5.0 - 6.0
Residences (domestic)—	
Porch	0.5
Hall (entrance)	0.5 - 1.0
Lounge, Sitting or Dining Rooms	2.0 - 3.0
Kitchen	2.0 - 3.0
Bedroom	1.0 - 2.0
Restaurant	3.0 - 4.0
School—	
Class Room	3.0 - 4.0
Corridor	0.5
Sewing—	
Light goods	2.0 - 3.0
Dark goods	6.0 - 8.0
Shop (interiors)	6.0 - 8.0
Shop Windows—	
Light goods	8.0 - 10.0
Medium goods	10.0 - 12.0
Dark goods	12.0 - 15.0
Showrooms	8.0 - 10.0
Studio	4.0 - 6.0
Theatre—	
Lobby	3.0
Auditorium	2.0
Warehouse	0.5 - 1.0
Yard Lighting	0.5 - 1.5

Example to determine the wattage of a lamp for a lounge room 16 feet x 16 feet. Walls and ceiling light in shade and light opal semi-indirect type reflector:—

$$\text{Lumens} = \frac{256 \times 2}{1 \times .34} = 1490$$

The nearest size lamp would be a 150 watt gas-filled lamp.

## VACUUM CLEANING

Provision should be made in all buildings for some method of vacuum cleaning. Either of the two following systems may be adopted:—

- 1—A fixed piping system using an electrically-driven vacuum pump and separator.
- 2—Portable electric cleaners operated from power outlets installed throughout the building.

## STRUCTURAL FABRICATION

Arc welding has grown from an emergency means of repairing or building up castings until it now holds an important place in the structural and industrial fields. Electrically-welded joints, if properly made, are stronger in tension, torsion, compression or shear than riveted ones. The necessity of punching or drilling holes reduces the strength of the original section, whereas welding strengthens it. The cost of welding usually is less than that of riveting, and the main reason for its restricted use in the fabrication of steel structures is apparently due to lack of experience and appreciation of its possi-

bilities. As a joint or structure is only as strong as its weakest point, the weakness in riveted joints is usually compensated for by the use of correspondingly heavier metal. As welded joints can be made as strong as adjacent sections, lighter material can be used where welded rather than riveted joints are used.

Ten amp. power outlets should be provided for portable electric cleaners.

The maximum advantages inherent in using arc welding can only be gained by designing the work specifically for welding. The erection of a welded structure can be carried out almost without noise, whereas in a riveted structure the noise of the riveting hammers, specially in city streets, becomes very objectionable.

(Continued on next page)



## HEATING

RAMSAY'S CATALOGUE



## CABLE MAKERS' ASSOCIATION

SARDINIA STREET, KINGSWAY, LONDON.

31c

S.A.A. File No.

Manufacturers of  
VULCANISED INDIA-RUBBER WIRES, CABLES AND  
FLEXIBLE CORDS



## C.M.A. WIRES, CABLES AND FLEXIBLE CORDS

C.M.A. Reg. Trade Mark, Nos. 36936-7-8.

## History of the Cable Makers' Association

For more than 30 years the electric cable industry in Great Britain has been one of the most highly organised trades in the country, under the guidance of the Cable Makers' Association, which was founded in 1899. At that time the principal business was in rubber-insulated cables, and, as it is quite beyond the power of an ordinary buyer to determine the quality of a rubber-insulated cable by inspection, there was a great temptation in commercial competition to lower prices at the expense of quality, a fact which would not be discovered by the buyer perhaps for some years, when it would be found out with very serious and costly results. These facts being well recognised by the firms then in the industry, an association was formed, having for its primary purpose the definition of standard qualities, below which the adhering firms agreed not to go.

The next step taken by the Cable Makers' Association was to standardise sizes and descriptions of cables to be marketed and warranties to be given, and eventually it has also created common labelling systems and the marketing by trade mark and registered design, these being the property of the Association and used only by its members.

Known all over the world as the C.M.A., the Cable Makers' Association has elaborated a system of co-operation with the other organisations in the industry in Great Britain, such as the British Electrical and Allied Manufacturers' Association, the Lamp Manufacturers' Association, and the Electrical Contractors' Association.

Throughout the electrical industry, the C.M.A. is the recognised authority in England on all matters affecting electric wires and cables.

## Labelled Coils

Every coil of C.M.A. cable bears a label (in buff colour) as shown in the accompanying illustration.

In addition, the tape wound over the india-rubber core under the braid or lead has the maker's name printed continuously along its length. Users should make a point of examining both the labels on the coils and the tape around the core.

## Classes of Cables

Electric light and power cables may be divided into three classes:—

1. Cables insulated with rubber for internal lighting, heating and power.
2. Cables insulated with vulcanised bitumen, either solely, or in conjunction with fibrous materials, principally for use underground.
3. Cables insulated with impregnated paper and sheathed with lead, chiefly used underground.

Rubber-insulated cables were the first and, in the early days of electrical engineering, the only cables used, and their use to-day is still very large for all purposes where high insulation and easy fixing and manipulation are primary considerations.

Rubber insulation is usually applied to the tinned conductors in three stages. The first layer consists of absolutely pure rubber, without mixture of any kind. For the cable makers' processes it is essential that it should possess certain good mechanical properties, and it should be free from anything which would have a deleterious effect on the conductor.

Compound or vulcanised rubbers are usually applied in two layers, often referred to as the "separator" and "jacket," the former being usually drab in colour, and the latter grey.

These have for their bases hard fine Para or first-grade British plantation rubber, and are vulcanised with a minimum proportion of pure sulphur, and mixed with mineral matter only to the extent required for the particular grade of cable which it is intended to produce.

A lapping of waterproof tape is applied over the vulcanised rubber, and the cable is then vulcanised into a homogeneous mass.

The radial thicknesses of vulcanised rubber insulation adopted as standards for various working pressures by the B.E.S.A., together with the test pressures and other standard details, will be found in the Standard B.E.S.A. Specifications.

As regards outer coverings, rubber cables may be braided and served with jute, this being the most usual finish for house wires and small cables, or they may be lead covered over the tape and armoured, if they are to be exposed to bad atmospheric or moisture conditions, or to mechanical damage. Special coverings are used where special conditions have to be met.

Trailing cables for portable motors, lamps, etc., are especially exposed to mechanical damage. Metallic armourings are not generally suitable for this class of work, braiding or whipcord, or lappings of tarred rope being usually preferred.

## Special Types of Cables

The following are several types of cables manufactured by Members of the Cable Makers' Association to meet special conditions:—

## OZONE-PROOF CABLES FOR EXTRA HIGH-PRESSURE WORK

With the advent of high voltages, considerable trouble has been experienced on high-pressure, alternating current circuits where vulcanised india-rubber cables are used for switchboard connections and similar purposes. Numerous experiments have shown that this is due to the generation of ozone (a concentrated form of oxygen), or rather to nitrous compounds of a secondary nature, on surfaces and at the ends of the cable, which causes a rapid disintegration of the rubber.

It is impossible to state definitely at what pressure the effect of ozone is noticeable, as so much depends upon the local conditions, but broadly speaking, it may be taken that serious trouble is not likely to occur at a lower pressure than 5,000 volts, although cases have been known, where the conditions have been favourable for the generation of ozone, of trouble being experienced at lower pressures.

This difficulty, however, has been overcome by applying to the outside of the rubber a covering of special material which is not affected by ozone, and which, at the same time, does not materially reduce the flexibility of the cable.

## FIRE-RESISTING CABLES

A study has been made of fire-resisting cables, and three types have been standardised, which are considered sufficient to meet ordinary requirements. These cables are insulated in the usual manner with pure and vulcanised india-rubber, and taped, being then finished as follows:—

## C.M.A. (REGD.) CABLE.

Insulated with Pure and Vulcanised India Rubber.  
MADE IN ACCORDANCE WITH THE STANDARDS AND  
FORMULAE OF THE CABLE MAKERS' ASSOCIATION

## OF WHICH WE ARE MEMBERS

Guaranteed Insulation Resistance per mile after  
24 hours' immersion in water at 60° Fahr., and  
one minute's electrification with 500 Volts — megohms

Length \_\_\_\_\_ Size \_\_\_\_\_

Megohm Grade \_\_\_\_\_ Classification \_\_\_\_\_

Date of Manufacture \_\_\_\_\_



C.M.A.

Registered Trade Mark  
Nos. 42217-19-21Maker's Name  
and  
Address.

Please see that this Label and Seal are intact.



Type 1.—Treated with special fire-resisting compound covered with one or more braidings of cotton or yarn, and treated with special fire-resisting compound overall.

Type 2.—Treated with fire-resisting compound and braided with one or more coats of specially prepared asbestos varn of much greater mechanical strength than ordinary asbestos, finally treated with fire-resisting compound. The combination of special asbestos treated with special compound produces a cable with very high fire-resisting properties.

Type 3.—Similar to Type 2, but over the asbestos braiding is placed one or more additional braidings of cotton or yarn, treated with special fire-resisting compound.

#### SOLID RUBBER-SHEATHED CABLES (also known as "Cab Tyre Sheathed")

For all situations where cables are subjected to very rough usage, and in consequence a strong and durable protection is necessary, solid rubber-sheathed cables are strongly recommended. Solid rubber sheathing is extremely tough and wear-resisting; it will outlast nearly all the usual forms of protective coverings for cables, while it is without many of the dangers associated with a number of such coverings. Solid rubber sheathing is smooth, uniform and clean; it will resist the actions of oils, acids, alkalis and corrosive fluids, and is unaffected by ordinary variations of temperature. It is an ideal covering for flexible trailing cables, and is largely used with electric travelling cranes, coal cutters, and in places where hard wear and rough usage are unavoidable.

#### DYNAMO AND MOTOR CONNECTIONS

Special flexible cables are made for these connections with tinned copper wires, insulated with pure and vulcanised india-rubber, taped, braided and compounded; or plain copper wires, cotton-covered, then pure india-rubber insulated, cotton-covered and glaze-braided overall; or plain copper wires, cotton-covered and glaze-braided overall. The cables can also be supplied, if desired, with a soft cotton braid, shellac varnished, in place of glaze-cotton braid, or in the larger sizes, with a stronger braiding of coloured hemp in place of the glaze-cotton.

#### FLEXIBLE CORDS

Association, C.M.A., and all kinds of flexible cords suitable for pendant lamps, portable lights, etc., in houses, offices and workshops, are manufactured by members of the Cable Makers' Association and constructed to comply with the I.E.E. Wiring Rules, finished with silk, glaze-cotton, compounded braiding spiral wire armouring, steel braiding, hard cord, solid rubber, etc.

#### WIRING SYSTEMS

Of late years, there has been an increasing use in private house, office and factory installations of what are generally known as "Twin Wiring Systems." Several of the leading C.M.A. manufacturers have their own standard wires, fittings and accessories for such systems, and the quality and thickness of insulation are the same as those referred to above in connection with rubber-insulated wires. While there are minor differences in detail, the main features are similar with all makers, i.e., the wiring consists of two or three rubber-insulated and taped cores laid side by side and sheathed in a flat section with special metal alloy.

The principal advantages of these surface wiring systems are ease of erection with less inconvenience to occupants or tenants, and freedom from damage to existing walls and decorations, etc. As the finished cables carry their own mechanical protection of the flexible covering of special metal alloy, the use of conduit is avoided, the resulting wiring is not unduly conspicuous when erected, and can be readily painted or distempered to match the surrounding surfaces.

Any of the Manufacturers' representatives will be pleased to furnish further details of their respective Wiring Systems.

#### C.M.A. Members, Branches and Agents

Members of the Cable Makers' Association can supply the highest quality V.I.R. wires, cable, and flexible cords for all purposes for which rubber-insulated cables are suitable. Specifications will be prepared to meet individual requirements, and the highest expert advice is obtainable from all representatives of Members of the C.M.A. in Australia. The names of the Members of the C.M.A. who are represented in Australia and of their Representatives and Agents in the various States are as follows:—

NAME OF MEMBERS OF C.M.A.	NAMES OF REPRESENTATIVES AND AGENTS.
British Insulated Cables Ltd.	Representatives—N.S.W., Victoria, Queensland and South Australia: The Australian General Elec. Co. Ltd. Tasmania: Messrs. Oliver and Oliver Pty. Ltd. W.A.: Messrs. Chas. Atkins & Co. (W.A.) Ltd.
Callenders' Cable & Construction Co. Ltd.	Representatives—Vic., Tas., S.A.: Noyes Bros. (Melb.) Pty. Ltd. N.S.W., Q'land, N'castle: Noyes Bros. (Sydney) Pty. Ltd. Agent—W.A.: Messrs. J. R. W. Gardam & Co.
Ediswan Cables Ltd.	Representative—N.S.W., Victoria, Queensland, S.A.: Edison Swan Elec. Co. Ltd.
Enfield Cable Works Co. Ltd.	Representative—N.S.W. Enfield Cable Works (A/asia) Ltd., Sydney. Agents—Vic.: W. G. Watson & Co. Ltd. S.A.: Dankel & Co. Q'land: W. E. Peterman, Brisbane. W.A.: Gibbs, Bright & Co. Newcastle: W. G. Watson & Co. Ltd.
W. T. Glover & Co. Ltd.	Representatives—Vic., N.S.W., Q'land, S.A., Newcastle: The Lawrence & Hanson Electric Co. Ltd. W.A.: G. G. Martin, Perth.
The Greengate & Irwell Rubber Co. Ltd.	Representative—Not yet appointed. Agents—Queensland: The Brisbane Electric Co. S.A.: Gerard & Goodman Ltd. Newcastle: National Elec. Engineering Co. Ltd. Tasmania: W. & G. Genders Pty. Ltd.
W. T. Henley's Telegraph Works Co. Ltd.	Representatives (Branch House)—Vic., N.S.W., Q'land: W. T. Henley's Tel. Works Co. Ltd. Agents—S.A.: Messrs. Newton, McLaren Ltd. W.A.: Messrs. Geo. Wills & Co. Ltd. Tas.: Messrs. Murdoch Bros. Pty. Ltd. N'castle: Messrs. Gibson, Battle & Co. Ltd.
The India Rubber G.P. & Tel. Works Co. Ltd.	Representatives (Branch House)—Victoria, N.S.W.: India Rubber Gutta Percha & Tel. Works Co. Ltd. Agents—Q'land: Geo. Wills & Co. Ltd. S.A.: R. C. Forbes & Co. Tasmania: Harrison Bros.
Johnson & Phillips Ltd.	Representatives (Branch House)—N.S.W., Vic.: Messrs. Johnson & Phillips Ltd. Agents—Queensland Engineering Supply Co. of Aust. Ltd. S.A.: Unbehaun & Johnstone Ltd. W.A.: Unbehaun & Johnstone (W.A.) Ltd. Newcastle: J. P. Kennaway. Tasmania: Medhurst & Sons Pty. Ltd.
The Liverpool Electric Cable Co. Ltd.	Representative—N.S.W.: Liverpool Electric Cable Co. Ltd. Agents—Vic.: Warburton, Franki (Melb.) Ltd. Q'land: The Intercolonial Boring Co. Ltd. S.A.: Langsford, Cooper Ltd. W.A.: Carlyle & Co. Newcastle: Martin De Launay Ltd.
The London Electric Wire and Smiths Ltd.	Representative—N.S.W.: Chas. Macintosh & Co. Ltd. Agent—Queensland: J. Campbell & Sons Ltd.
The Macintosh Cable Co. Ltd.	Representative—Victoria, N.S.W., S.A., W.A., Newcastle: Messrs. British General Elec. Co. Ltd. Agent—Queensland: Norman Bell & Co. Ltd.
Pirelli-General Cable Works Ltd.	Representative—Victoria, N.S.W., Newcastle, S.A., Queensland: Siemens (Aust.) Pty. Ltd. Agent—W.A.: H. C. Little & Co. Ltd.
Siemens Bros. & Co. Ltd.	Representative—N.S.W., Victoria: Standard Telephones & Cables (A/asia) Ltd.
Standard Telephones & Cables Ltd.	



<div>31 d</div> <div>S.A.A. File No.</div>	<div>NILSEN CROMIE PTY. LTD.</div> <div>Electrical Engineers</div> <div>Works:</div> <div>29 CROMWELL STREET, COLLINGWOOD</div> <div>J 3705</div>	<div>FEDERAL — NILCROM — FUSE UNITS</div>
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## Switch and Fuse Gear

"Federal" Fuse Units, "Federal" Ironclad Cut-Outs, "Federal" Ironclad Switch, "Federal" Combined Switch and Fuse, "Nilerom" House Service or Pole Fuse, "Nilerom" Junction Boxes, Earth Clips.

## Manufacture

All Nilsen, Cromie products are made in Australia from materials of the best quality of their several kinds. Manufacture is under strict supervision, resulting in a finished article of the highest class as is essential to a satisfactory and safe electrical installation.

## Tests

The materials used in Nilsen Cromie electrical equipment have to pass rigid inspection and tests before being used in manufacture. Also, the finished equipment is made to a definite standard both electrically and mechanically, and has been approved of for use in electrical installation by the State Electricity Commission of Victoria and electrical authorities in other States.

## "Federal" Ironclad Cut-outs

The fuse units in these cut-outs are as described on this page, all contacts being effectively shielded. The cases are provided with pin-drilled locking pin for sealing, making them particularly suitable for House Service or industrial installations. The Covers are lined with insulating material.

## Dimensions—

15 amp.— $4\frac{1}{2}$  x  $3\frac{1}{2}$  x 3 ins.  
30 amp.— $5\frac{1}{2}$  x  $3\frac{1}{2}$  x  $3\frac{1}{2}$  ins.  
60 amp.— $7\frac{1}{2}$  x  $4\frac{1}{2}$  x  $4\frac{1}{2}$  ins.



Ironclad Cut-out with Insulated Cover.

## "Federal" Ironclad Switches

This switch is made in 500 volt, 2 or 3 pole types and is particularly suitable for industrial use for motor control, or for lighting and heating circuits.

The wiring is through holes in porcelain blocks, contacts being readily accessible.

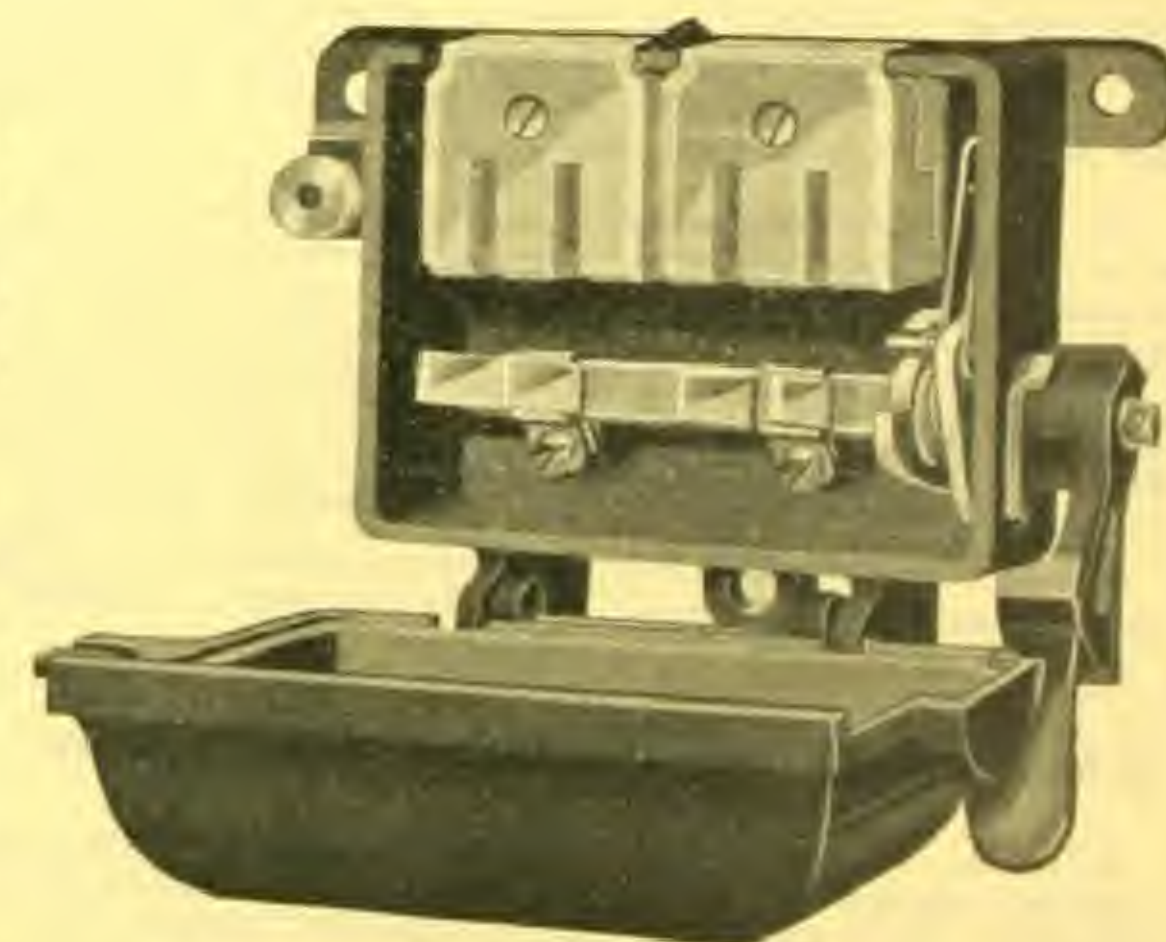
## Dimensions—

## Double Pole:

15 amp.— $5\frac{1}{2}$  x 4 x 4 ins.  
30 amp.— $7\frac{1}{2}$  x  $4\frac{1}{2}$  x  $5\frac{1}{2}$  ins.

## Triple Pole:

15 amp.— $7\frac{1}{2}$  x 4 x 4 ins.  
30 amp.— $9\frac{1}{2}$  x  $4\frac{1}{2}$  x  $5\frac{1}{2}$  ins.

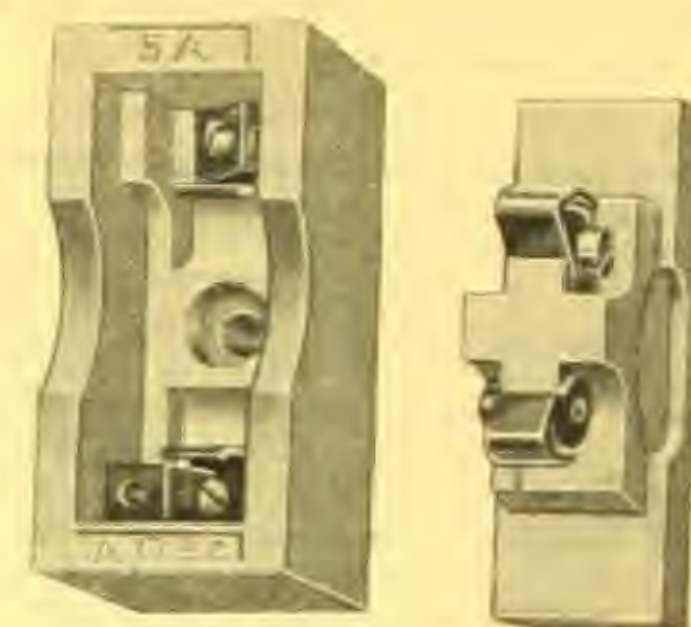


Ironclad Switch—Quick Make and Break.

## "Federal" Fuse Units.

250 volts, 5 amps.  
(at right)

250 volts, 30 amps., and  
500 volts, 15 amps.  
upwards.  
(below)



## Fuse Units

Each pattern is specially designed for the pressure on which it has to operate, and it is important that the correct unit be used.

The units are made in three types:—

Type A: Arranged for connecting to busbar one end and front wiring the other, for use in Distribution Boards.

Type B: Arranged for front wiring both ends, for use in cut-outs and for general purposes.

Type C: Arranged for back connections. In the smallest size, cable entry is direct to back of terminal; the other sizes are arranged with studs and nuts for back connection.



### "Federal" Combined Switch and Fuse

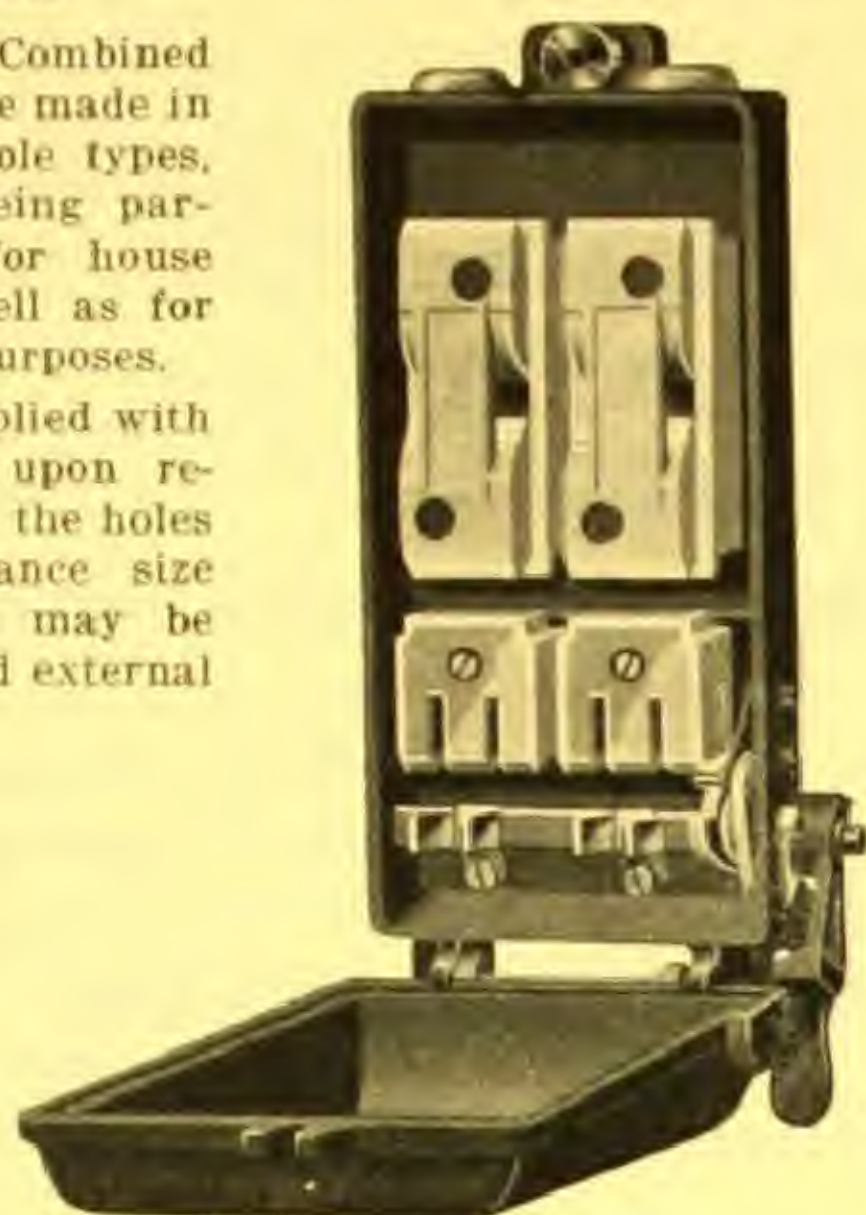
The "Federal" Combined Switch and Fuses are made in 500 volt 2 and 3 pole types, the combination being particularly suitable for house service work, as well as for general industrial purposes.

The switch is supplied with bushed holes, and upon removal of the bushes, the holes are standard clearance size for conduit, which may be fixed by internal and external locknuts.

#### Dimensions—

15 amp. double pole, 2-3/4 in. cable entry at top. Overall dimensions: 9 1/2 in. x 5 in. x 4 in. projector.

30 amp. triple pole, 2-1 in. cable entry at top. 11 in. x 8 1/2 in. x 5 1/2 in. projector.



### "Nilcrom" House Service or Pole Fuse

This fuse has been designed to assist supply authorities to more efficiently handle their fusing problems, particularly in regard to private houses, shops and overhead mains. The Fuse Housing is designed with an aperture at the bottom, which enables the cartridge to be extracted and replaced by means of a forked metal head (called extractor head) which is fitted to the end of a light wooden rod. This method eliminates the use of ladders in attending to blow-outs. The Fuse has been designed in two types: universal type, suitable for either horizontal or vertical attachment; and the Pole Bracket type, suitable for pole or vertical attachment only.

These fuses have been standardised by a large number of supply authorities, including State Electricity Commission of Victoria, Rockhampton City Council and Brisbane City Electric Light Co., Queensland, Perth Electricity Dept., W.A., and Auckland and Marlborough Power Boards in N.Z.



Pole Fuse—Bracket Type.

## OTHER "NILCROM" PRODUCTS

### Junction Boxes

Junction Boxes are watertight units for built-in outlets, and are used in the best class of conduit work when a pull-in job is desirable. They are made from grey cast iron with boxes to take one, two, three or four-way circuits; boxes are covered with a 20 S.W.G. mild steel lid. Round boxes (see illustration) are made to fit 5/8 in., 3/4 in. and 1 in. conduit.



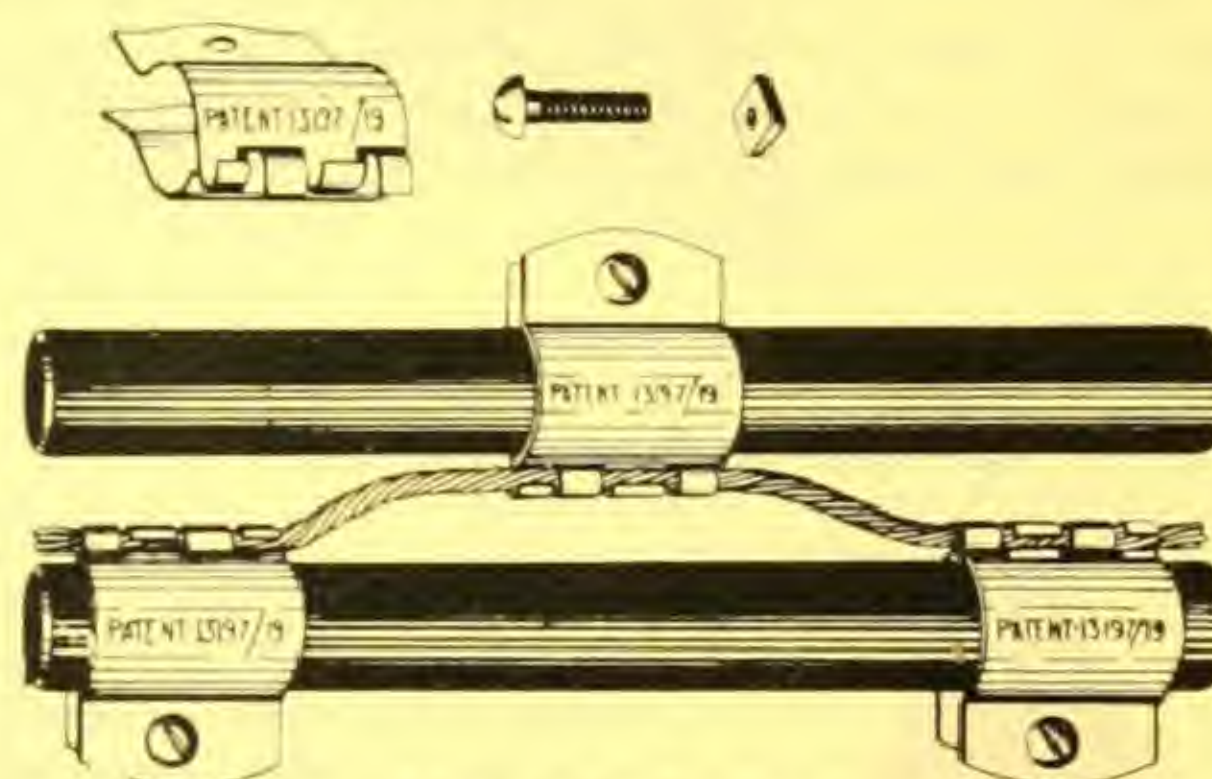
C.I. Junction Box.

### Flush Switch Mounting Boxes

For effective protection, flush switches are mounted in boxes set into the wall. A screwed connection is made with the conduit and thus a watertight and well-grounded system is completed. These boxes are made in cast iron and are drilled and tapped to take the standard flush switch and flush plug. Inlets are drilled to take 3/4 in. screwed conduit.



Neutral Link with Cover.



Earth Clip Assembly.

### Earth Clips

Used for ensuring adequate and safe grounding of conduits. "Nilcrom" earth clips are made up from the best quality galvanised hoop iron, 1 in. by 18 S.W.G., in accordance with the S.E.C. and F.U. Rules for installation. No soldering is required; screw and nut are sheridized.

### Neutral Links and Bars

Neutral links (see illustration) are made from 1/2 in. by 1/16 in. brass rods to take five tappings; supplied complete with a neat cast iron, stove-enamelled cover.

Neutral bars—made to the specification of the S.E.C. for their multiple earthed neutral system—are supplied in single, double and triple circuits for lighting; also in three circuit lighting and two circuit power.



# THE AUSTRALIAN GENERAL ELECTRIC CO. LTD.

31f

S.A.A. File No.

N.S.W.—The Australian General Electric Co. Ltd., 95 Clarence Street, Sydney; and at Keen Street, Lismore; 53 King Street, Newcastle.

VICTORIA—The Australian General Electric Co. Ltd., 108 Queen Street, Melbourne; and at Dean Street, Albury; 197 Whitehorse Road, Box Hill; Murray Street, Colac; Johnson Street, Maffra.

S.A.—The Australian General Electric Co. Ltd., 27 Grenfell Street, Adelaide.

QUEENSLAND—The Australian General Electric Co. Ltd., cr. Queen and Adelaide Streets (Petrie's Bight), Brisbane; and at 158 East Street, Rockhampton; Flinders Street East, Townsville.

W.A.—Agents:—Messrs. Atkins (W.A.) Ltd., 894 Hay Street, Perth.

TASMANIA—Agents:—Messrs. Oliver and Oliver Pty. Ltd., 9 Argyle Street, Hobart; and at Quadrant, Launceston.



[For Other Products, See Pages 429, 436 and 450]

## SHOW WINDOW LIGHTING

### X-Ray Reflectors

X-Ray focal point reflectors are designed with scientific accuracy to efficiently produce a required distribution of light. The completeness of the line provides light control to meet every requirement.

X-Ray reflectors are blown in one piece from the highest quality glass. Designed with a double system of radial and special corrugations and coated with pure metallic silver they deliver a light beam of remarkable smoothness. The exteriors of these reflectors are finished with "Silver-tone," a protective silver finish.

### Lighting Guarantee

An installation of X-Ray Reflectors will be found in practically every important store in Australia, and our experience with these installations over a long period of years enables us to guarantee complete satisfaction, providing the reflectors are correctly installed, and used at rated capacity.

### Design of Show Window Lighting

The number of reflectors to use is optional. No set rule can be established. It is influenced by a number of conditions, such as the brightness of neighbouring windows, the intensity of the street illumination, kind of goods on display, and largely the extent of the user's realisation of the advertising and selling value of bright windows.

The closer the reflectors are spaced, the brighter becomes the light in the window, and vice versa. For the average installation, the spacing or distance from centre to centre of the reflectors, is from 12 to 24 inches. Under *ordinary conditions*, large windows should be lighted with No. 500 or No. 510 reflectors with 200-watt Mazda lamps. For *medium-sized windows*, No. 400 and No. 410 reflectors, using 150-watt Mazda lamps, should be installed.

### Distributing Type Reflectors



X-Ray reflectors of the distributing type are recommended for windows having a depth **greater** than half their height. They should be used for any high trim window or if it is desired to project the light back into the shop.

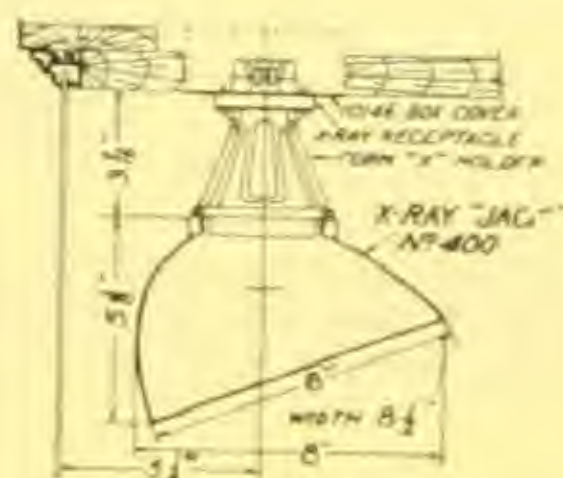
#### No. 400. "JACK"

For windows less than 8 ft. high and having depth greater than half the height.

#### No. 500. "KING"

For windows 8 ft. or higher, having depth greater than half the height.

See above for wattage of lamps to be used to suit both types.



### Concentrating Type Reflectors



Reflectors of the concentrating type are recommended for windows having a depth **less** than half the height or for low trim windows. This type of reflector should be used in open windows when the light is not to be reflected back into the shop.

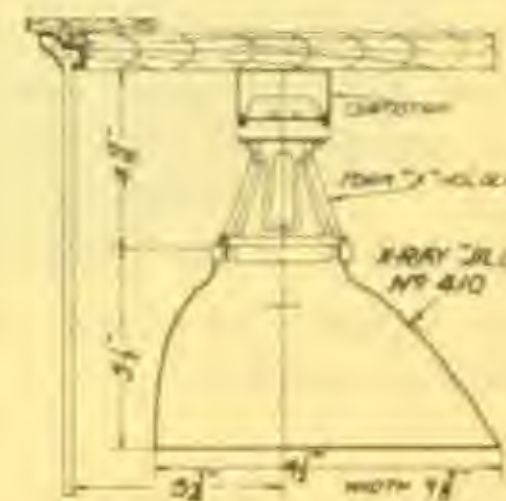
#### No. 410. "JILL"

For windows less than 8 ft. high and having depth less than half the height.

#### No. 510. "QUEEN"

For windows 8 ft. or higher having depth less than half the height.

See above for wattage of lamps to be used.



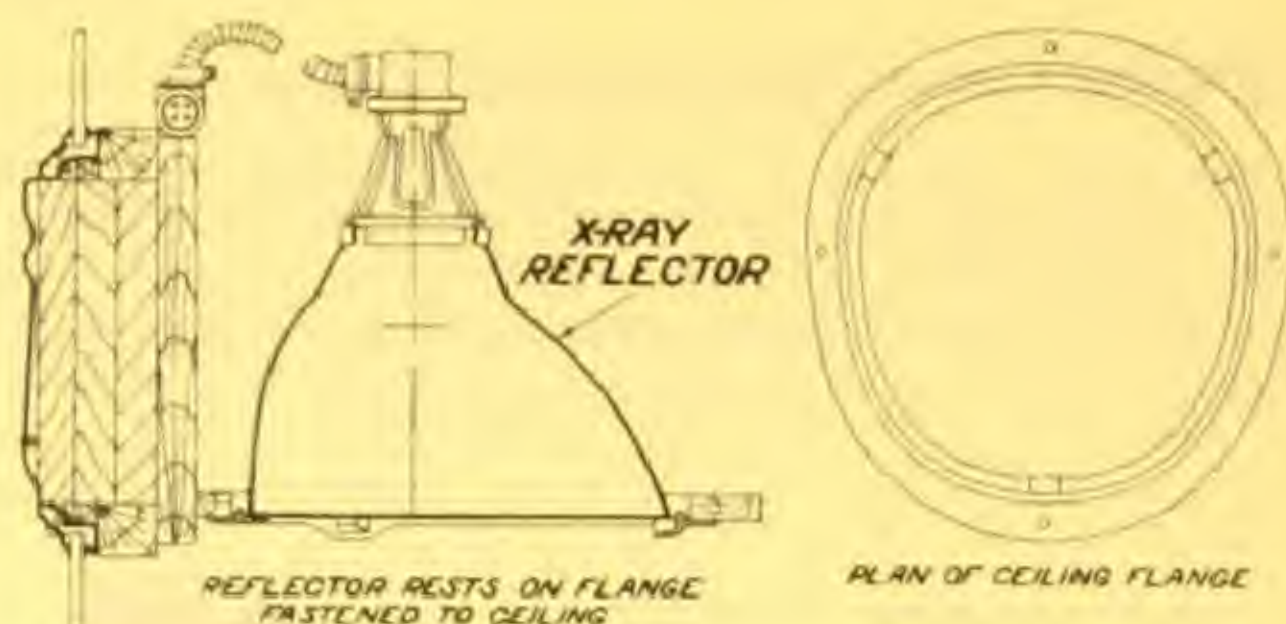
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### Recessing Equipment (Ceiling Flanges)

To provide flush mounting of the reflectors, X-Ray ceiling flanges consisting of metal rims are available for recessing the reflectors. They are made of cast iron provided with four holes for screws for attaching to ceiling. They are supplied unfinished. Where No. 400 or No. 500 reflectors are used, it will be noted that they are cut off at an oblique angle. To set these successfully it is necessary to construct the ceiling with a dip towards the window.

When recessing X-Ray reflectors, it is necessary that the opening in the ceiling be cut to the proper contour. Obtain either a template drawing or a sample flange, before cutting openings.



### Show Window Colour Lighting

Certain types of displays are very effectively shown under coloured lights. When it is used with discretion, colour lighting will produce results with greater attractive power than white light can possibly have. Each installation of X-Ray window reflectors and flood-

lights should be equipped with X-Ray "Colour Ray" attachment consisting of a light metal frame with spring clips for fastening to each reflector and four sheets of gelatine in red, amber, green and blue. These colours can be blended very effectively, especially with the use of X-Ray floodlights.

## SHOW WINDOW AND INTERIOR FLOODLIGHTING



No. 33A. "FLOOD-RAY," with Colour Equipment

Is used to concentrate a "centre spot" beam and flood of light on a display. Regularly supplied with colour equipment. Use 200-watt Mazda lamp.

With a centre spot-beam for concentrating a high intensity of light upon a single object while brilliantly lighting a larger surrounding area at the same time, X-Ray floodlights are ideally suited for many uses, in show windows and other interiors—they are now considered a standard article of equipment for all show windows.

All X-Ray floodlights are equipped with swivel bases to allow the unit to be directed as desired. Colour frames are standard equipment, although floodlights are obtainable without colours. All exposed surfaces are finished in green, providing a neat appearance.

#### CONTROL RING

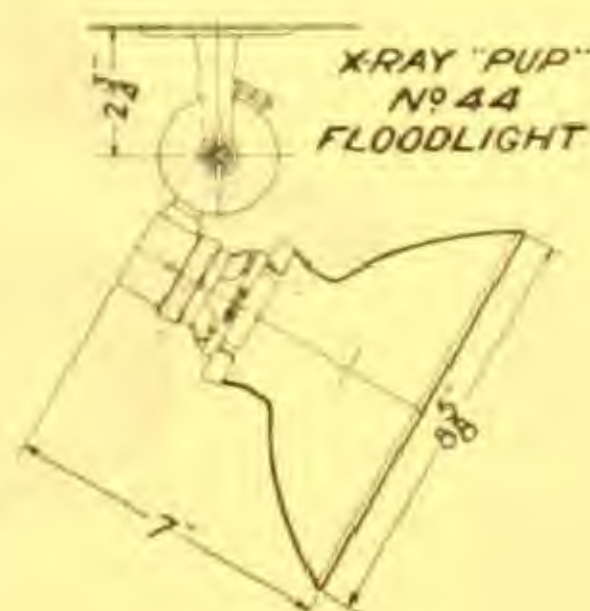
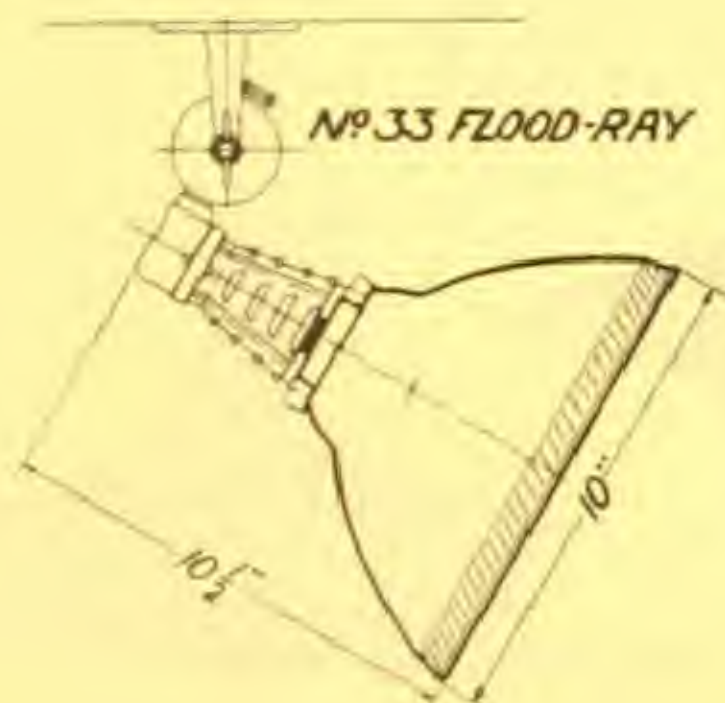
Soon after the window floodlight with centre spot-beam was originated, it was discovered that the users frequently desired a strong narrow beam (of white or colour) without the accompanying wide spread of spill light. The X-Ray Control Ring eliminates this spill light and leaves only the beam. Colour frames, which are standard equipment for the floodlight, are not interfered with while the control ring is in use.

Control rings are only used with Nos. 33 and 88.



No. 44. "PUP"

A small floodlight which concentrates a smooth narrow beam. Use 100-watt Mazda lamp.



No. 88. "HIPPO," with Control Ring in place

A high intensity floodlight for producing a wide spread of light with a powerful "centre spot-beam." Regularly supplied with colour equipment. Use 300 or 500 watt Mazda lamp.

(Continued on next page)

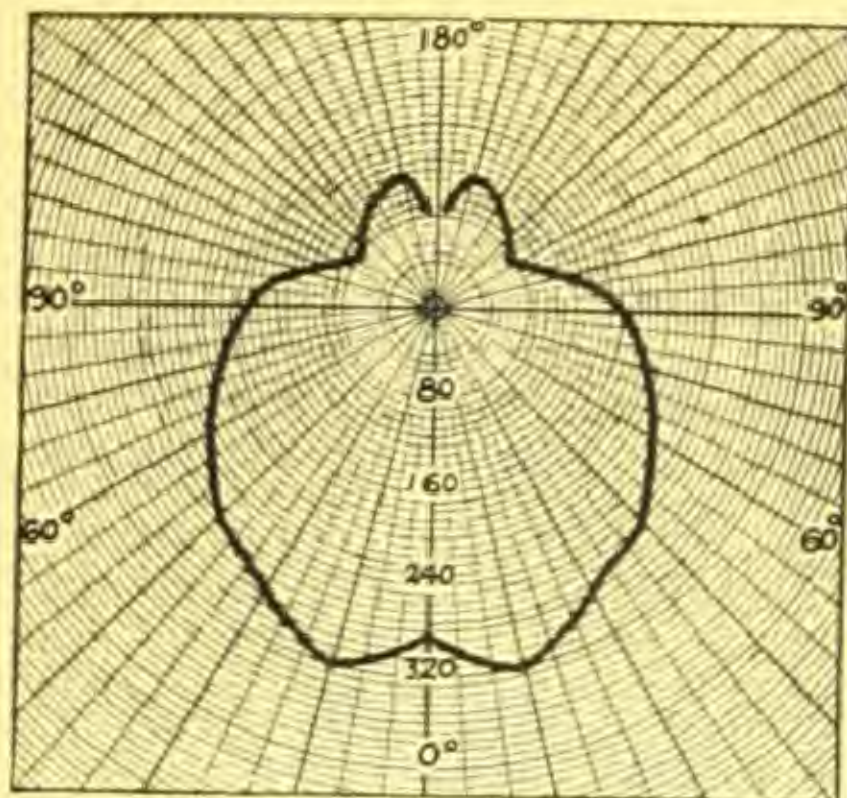


## COMMERCIAL LIGHTING

## Complete Commercial Lighting Service

The first requirement of a lighting system is to provide enough light for comfortable vision in the performance of the work at hand, whatever it may be. An abundance of light without glare is the simple but classic recipe.

THE IVANHOE "TROJAN"



How the "Trojan" distributes light.

Distributing diffused light above and below the mounting plane, it produces pleasing, delightful illumination in all directions without sharp shadows or annoying glare.

## Where Used

It is suitable for the lighting of offices, stores, schools and all similar interiors.

For most desirable results, the Trojan should be spaced one and a half times the mounting height above the working plane.

## SIZES AND DIMENSIONS

Number of Glass	Dimension in Inches			Recom- mended Mazda C Lamps. Watts.
	Diameter	Depth	Fitter	
5264 x 9 Genco	9	5½	4	75-100
5264 x 9 Genco 466	9	5½	4	75-100
5264 x 9 Genco 467	9	5½	4	75-100
5264 x 9 Genco 501	9	5½	4	75-100
5264 x 12 Genco	12	7½	4	100-150
5264 x 12 Genco 466	12	7½	4	100-150
5264 x 12 Genco 467	12	7½	4	100-150
5264 x 12 Genco 501	12	7½	4	100-150
5264 x 14 Genco	14	9	6	150-200
5264 x 14 Genco 466	14	9	6	150-200
5264 x 14 Genco 467	14	9	6	150-200
5264 x 14 Genco 501	14	9	6	150-200
5264 x 16 Genco	16	10½	6	200-300-500
5264 x 16 Genco 466	16	10½	6	200-300-500
5264 x 16 Genco 467	16	10½	6	200-300-500
5264 x 16 Genco 501	16	10½	6	200-300-500
5264 x 18 Genco	18	11½	8	300-500-750

Note.—The proper lamp for a globe of a given diameter depends entirely upon its application. A larger lamp will increase surface brightness. Excessive brightness interferes with vision.



THE IVANHOE "TROJAN"

THE IVANHOE "ACE"

A good commercial lighting unit consists of an enclosing globe of diffusing glassware of the right density and contour to absorb the maximum amount of light and to direct the maximum amount where it will be most useful; and of an attractive and well-constructed fixture to support the globe securely and hold the lamp in the correct position; such is the construction of the three different pieces of Ivanhoe glassware illustrated below.

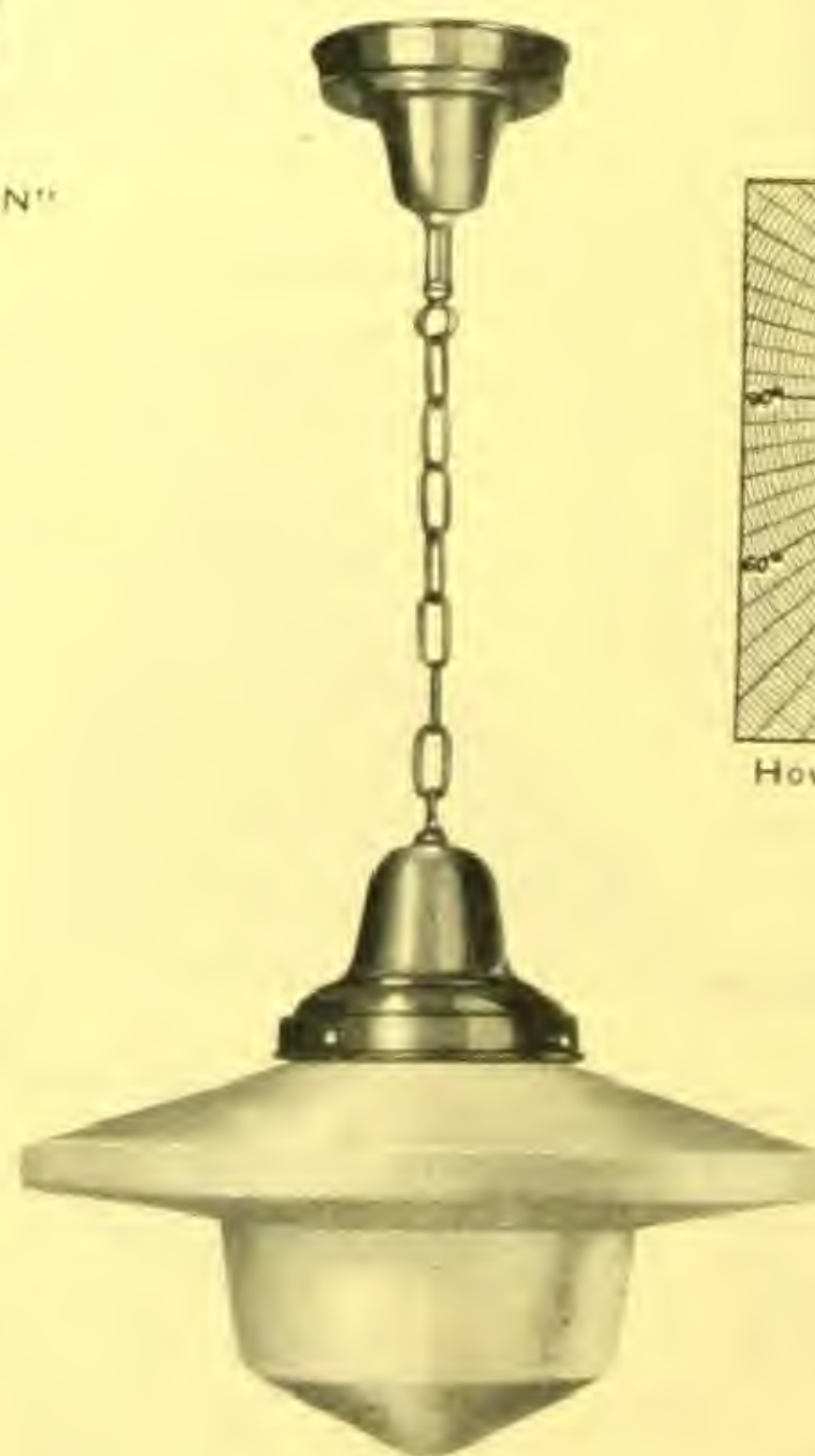
## Where Used

This unit is recommended for all kinds of commercial lighting where reflection factor of ceiling is not high, and is used with Mazda C lamps.

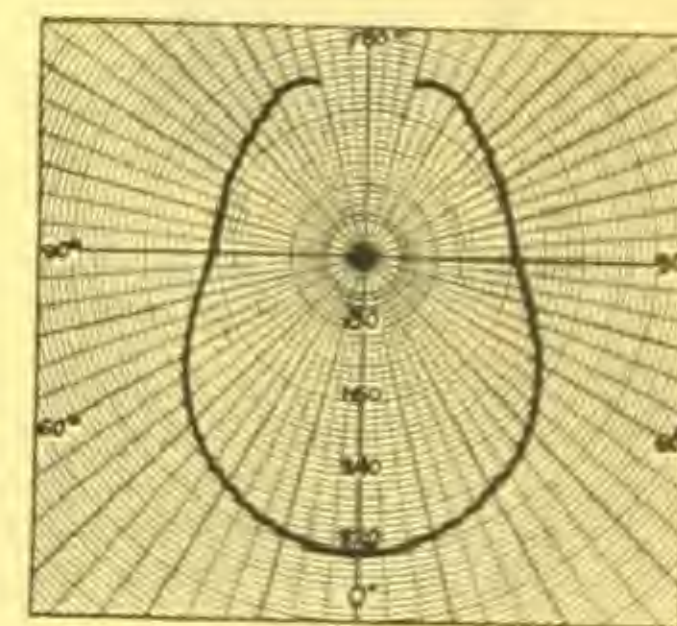
Same mounting height and spacing as for "Trojan."

## SIZES AND DIMENSIONS

Number of Glass	Dimensions in Inches			Recom- mended Mazda C Lamps. Watts.
	Diameter	Depth	Fitter	
5108 x 14 CE	14	7½	6	100-150
5108 x 17 CE	17	9½	6	200-300
5108 x 20 CE	20	10½	8	300-500



THE IVANHOE "ACE"



How the "Ace" Distributes Light.

(Continued on next page)



## INSTALLATION DATA (FOR "TROJAN" AND "ACE")

The following table is provided as a guide in deciding the quantity of light desirable for offices and other locations.

Type of Installation	Degree of Illumination— Foot Candles	
	Recom- mended	Under some conditions
Auditoriums, Churches . . . . .	3	2-4
Hospitals—		
Corridors . . . . .	2	1-2
Operating Room (Table) . . . . .	75	50-100
Ward Rooms, Private Rooms, General Lighting supplemented by Local Lighting . . . . .	3	2-4
Offices—		
Private, General . . . . .	10	6-12
Drafting Rooms . . . . .	15	10-20
Public Halls . . . . .	5	3-6
Restaurants, Lunch Rooms . . . . .	6	4-10
Schools—Class Rooms, Study Rooms, Library . . . . .	8	5-10
Show Rooms . . . . .	10	6-12
Shops—		
Show Windows . . . . .	10-70	—
Main Floor Department Shops; Shops on Bright Corners . . . . .	10	6-12
Other Shops—Clothing, Dry Goods, Haberdashers, Mill- inery, Jewellery, etc. . . . .	8	5-10
Other Stores—Chemist, Grocery, Meat, Bakery, Furniture, Confectionery, etc. . . . .	6	4-8

## WATTS PER SQUARE FOOT FACTORS

The following table shows the watts per square foot required to obtain various foot-candle intensities with the "Trojan" and "Ace," with Mazda C Clear Lamps.

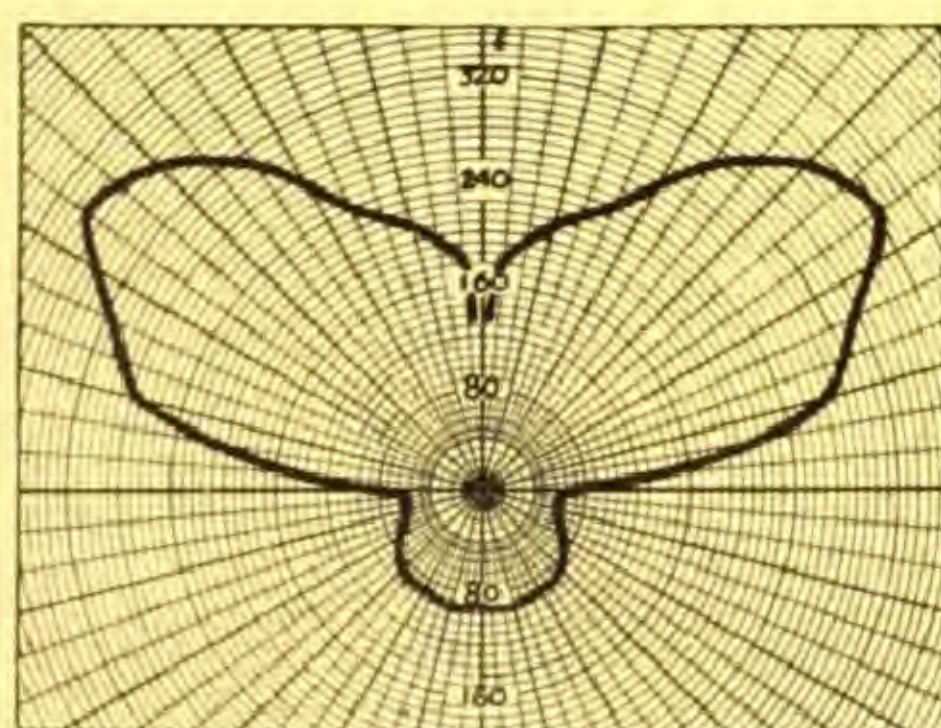
Class of Illumination as expressed in Foot- Candles	One Row of Units		More than One Row of Units	
	Light Walls and Ceiling	Dark Walls and Ceiling	Light Walls and Ceiling	Dark Walls and Ceiling
	Watts per Sq. Foot	Watts per Sq. Foot	Watts per Sq. Foot	Watts per Sq. Foot
1	.29	.33	.21	.25
2	.55	.64	.43	.48
3	.72	.84	.56	.63
4	.94	1.10	.75	.82
5	1.15	1.35	.91	1.00
6	1.35	1.55	1.05	1.15
8	1.75	2.05	1.35	1.50
10	2.15	2.50	1.70	1.85
12	2.50	3.00	1.95	2.20
16	3.30	3.80	2.55	2.85

## THE IVANHOE "KELDON"

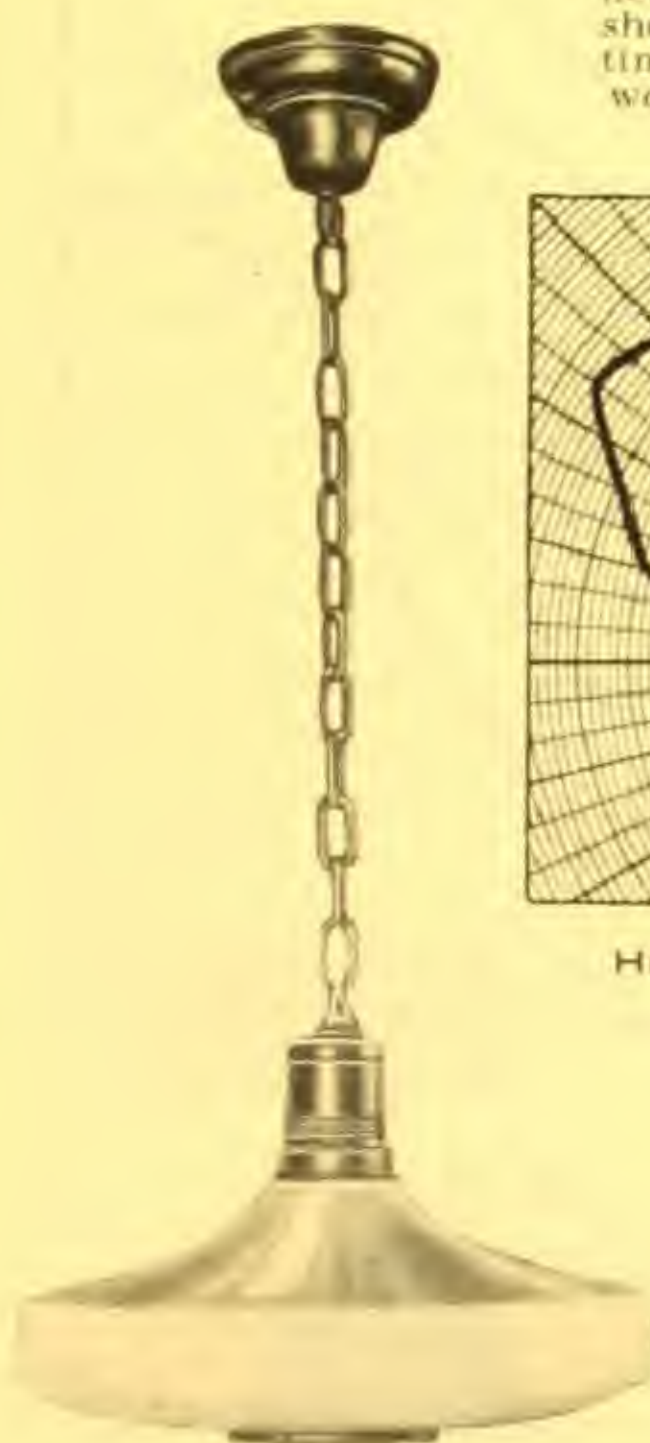
From the standpoint of maintenance the "Keldon" has two outstanding features:—(1) being totally enclosed, it does not suffer reduced efficiency through the accumulation of dust; (2) the lamp can be removed or replaced without removing the globe from its holder; the lamp and socket become quickly accessible by the removal of the bottom cap.

## Where Used

Recommended for offices, drafting rooms, reading rooms, schools, hospitals, and all other places where lighting of high intensity with diffused light is essential—55 per cent. of the light is directed toward the ceiling and 17 per cent. downward. The distance of the units from the ceiling should be approximately one-sixth the height of the ceiling. The spacing should not exceed one and one-half times the mounting height above the working place.



How the "Keldon" distributes light.



THE IVANHOE "KELDON"

## SIZES AND DIMENSIONS

Number of Glass	Dimensions in Inches		Recommended Mazda C Lamps. Watts.
	Diameter	Depth	
5363	14in.	5½in.	100-150
5363	16in.	6½in.	200
5363	18in.	7½in.	300-500

## INSTALLATION DATA

The following table shows the watts per square foot required to obtain the various foot-candle intensities with the "Keldon" and Mazda C Clear Lamp. (\*Light ceilings 70 per cent.; Medium walls 40 per cent.)

Foot-Candles	Small Rooms (16ft. x 16ft.) 9ft. to 10ft. Ceilings	Medium Rooms (35ft. x 100ft.) 10ft. x 12ft. Ceilings	Large Rooms (100ft. x 100ft.) Ceiling Height— 10ft. or more
4	1.25	.92	.78
5	1.65	1.23	1.04
6	1.85	1.37	1.16
8	2.50	1.84	1.55
10	3.10	2.28	1.94
12	3.70	2.72	2.32
16*	4.95	3.64	3.10

\*Ivory white, white or other colours having a reflection value of 70 per cent. or more are preferable for ceilings, and may be classified as light. Medium colours, such as Ivory, Tan Buff, also some Greens and Greys, having a reflection factor of 50 per cent. or more, may be used for walls. Ample allowance has been made for windows and doors in determining the reflection factor of 40 per cent. for walls. Sufficient allowance has been made to cover depreciation which might be expected under average conditions where lighting equipment is cleaned three or more times a year.

(Continued on next page)



## COVE LIGHTING

Modern lighting effects can be obtained by concealing reflectors in coves, urns, floor pedestals, column pedestals, on bookcases or show-cases, or in any of the decorative elements of a room. A decided advantage of this method of lighting is that all the reflector equipment is entirely hidden from view.



X-RAY SHELL TYPE  
REFLECTOR

Used under normal conditions where an efficient wide distribution with an average throw is required.



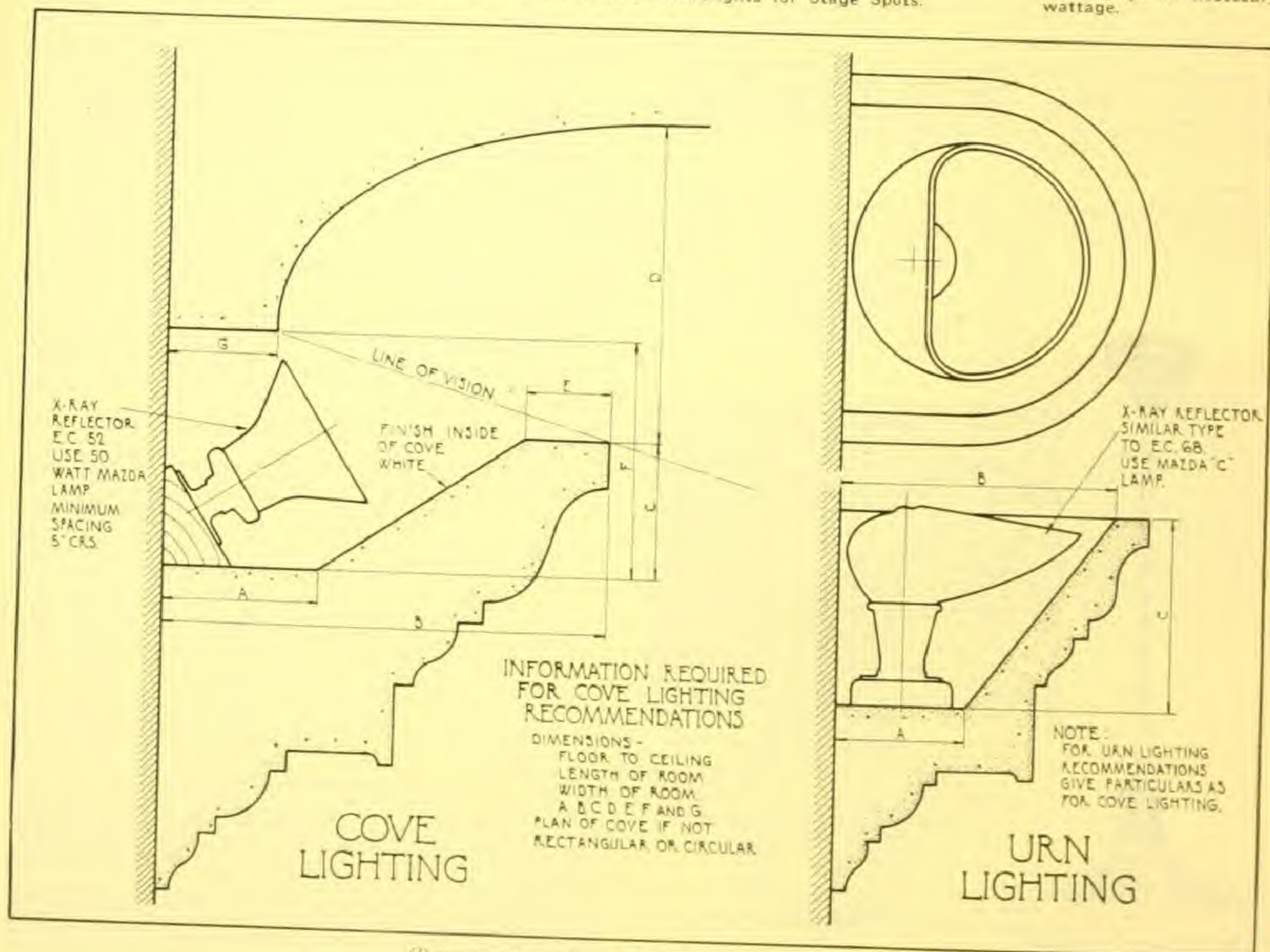
View of Main Auditorium of the Palais Pictures, St. Kilda, Victoria. 1,300 X-Ray Reflectors for Dome and Footlights were used, in addition to 21 Floodlights for Stage Spots.

Lighting from concealed sources accentuates the architectural spirit and purpose of the interior in a natural way. Do not hesitate to request the service of the nearest A.G.E. engineer. If sketches are supplied, as set out below, it is possible for the engineer to co-operate with the architect in the early stages, thus assuring superior results.



X-RAY CONCENTRATING  
TYPE COVE  
REFLECTOR

When the cove is near the ceiling, use this type with lamps of necessary wattage.



(Drawn by the Architectural Staff of Ramsay's Catalogue)



## INDUSTRIAL LIGHTING

## Correct Illumination—as an Aid to Industrial Efficiency

Good illumination has helped to point the way toward increased production, decreased spoilage, improved working conditions, fewer accidents, and a general improvement in industrial efficiency.

All industrial lighting may be divided into three classes:—General Overhead Lighting, Group Lighting, and Local Lighting.

## IVANHOE REFLECTORS

Ivanhoe reflectors are stamped or drawn of deep drawing steel. The finish of the Ivanhoe standard line of industrial equipment is porcelain enamel. This finish will stand up under dirt, moisture, and acid fumes with little if any deterioration of the reflecting surface. They are easy to clean—always an important consideration in the purchase of industrial lighting equipment.

## R.L.M. STANDARD DOME REFLECTORS

This type of reflector fulfils the requirements of the majority of lighting installation.

These reflectors are generally applicable to any industries which may be classified as Rough, Medium or Fine manufacturing. The depth of the R.L.M. standard dome is such that ample protection from glare of the lamp filament is provided when the reflector is used at the average mounting height.

When used for General Overhead Lighting, the distance apart should not exceed one and two-thirds times the mounting height above the work to insure uniform illumination. This rate can be increased to two or two and one-half where uniform illumination is not required, as in warehouses and spaces where rough work is performed.



R.L.H. Standard Domes are available as follows:—

Catalogue Name	Dimensions—Inches			Recommended Lamp Wattage
	Diameter	Depth	Fitter	
Bedd 100	12in.		2½in.	75-100
Bedd 150	14in.		2½in.	150
Bedd 200	16in.		2½in.	200
Redd 500	18in.		with Mogul Socket	300-500

## STANDARD BOWL REFLECTOR

Rules for the installation of the bowl type reflector are very closely related to those given for the dome type, but with this type the lamp filament is shielded at a lower angle. They are especially suitable for installation where reflectors must be mounted low, that operators will not be annoyed by excessive glare.

Bowl reflectors should be spaced a distance apart, approx. one two-thirds times the mounting height above the work for either General Overhead or Group Lighting, and when used for Local Lighting, must, of course, be located with reference to the work.



These reflectors are available as follows:—

Catalogue Name	Dimensions—Inches			Recommended Lamp Wattage
	Diameter	Depth	Fitter	
Beb 60	7½in.	5in.	2½in.	60
Beb 100	8½in.	6½in.	2½in.	75-100
Beb 150	9½in.	7½in.	2½in.	150
Beb 200	10½in.	8½in.	2½in.	200
Reb 500	12½in.	13in.	with Mogul Socket	300-500

## STANDARD ANGLE REFLECTOR



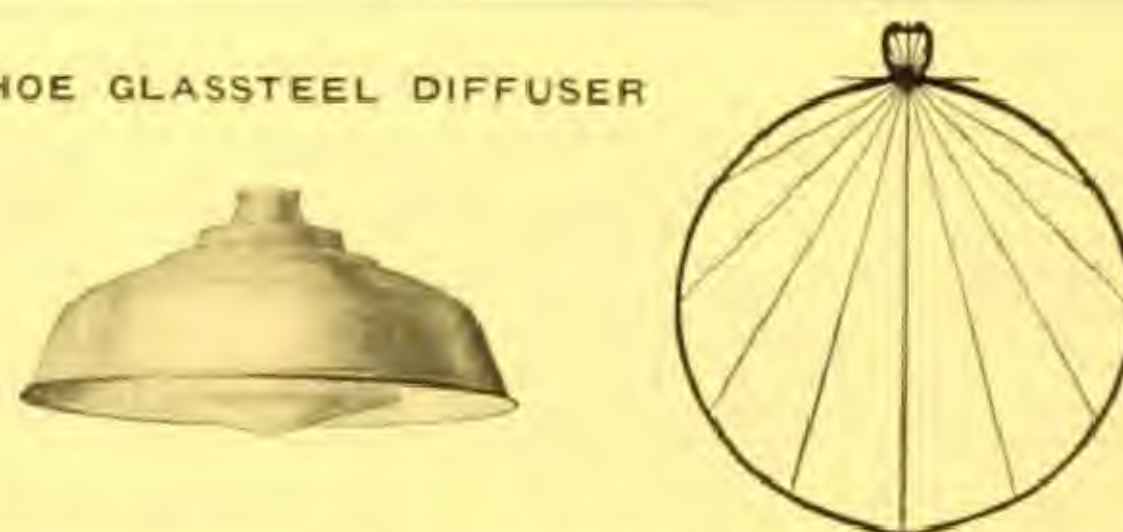
Angle type reflectors are particularly desirable in locations where the Overhead Lighting often comes from reflectors mounted rather high, and it is necessary to build up the illumination on the working plane from the side.

In the smaller sizes this type is good for Local Lighting. Angle reflectors are also used extensively for sign and billboard lighting.

Angle reflectors are available in the following sizes:—

Catalogue Name	Dimensions—Inches			Recommended Lamp Wattage
	Diameter	Depth	Fitter	
Bel 60	7in.	5½in.	2½in.	60
Bel 100	8½in.	6½in.	2½in.	75-100
Bel 150	10½in.	9½in.	2½in.	150-200
Rel 500	12½in.	11½in.	with Mogul Socket	300-500

## IVANHOE GLASSTEEL DIFFUSER



The Glassteel Diffuser, designed for high wattage Mazda C Lamps, is a combination consisting of an extra large dome reflector and an enclosing globe of light—density opal diffusing glass that entirely surrounds the lamp. The top of the reflector is perforated, through which light passes upward so that the entire workroom may be lighted. Its outstanding features are: (1) provides the highest type of lighting; (2) dust-proof and dirt-proof; (3) entire unit easily cleaned in place, and (4) mounting can be recessed when desirable.

(Continued on next page)



It is recommended for General Overhead and Group Lighting, or where light of high intensity is essential, or where direct or reflected glare must be eliminated.

Where illumination requirements call for colour value which more closely approximates daylight, the Tru tint glass globe should be used, i.e., printing and lithograph plants.

For uniform illumination, the Glassteel Diffuser should be spaced not more than one and one-half times the mounting height above the work.

It is available in the following sizes:—

Catalogue Name	Dimensions—Inches			Recommended Lamp Wattage
	Diameter	Depth	Fitter	
962	18in.	10½in.	Solid top u/- Socket	150-200
963	20½in.	13½in.	Solid top u/- Socket	300-500

#### VAPOUR-PROOF EQUIPMENT

Vapour-proof fittings afford a safe installation for powder plants, flour mills, oil refineries, and similar industries where electrical connections and lamps must be protected from acid fumes or inflammable dust and vapour. The R.L.M. Dome has been adapted for use on these fittings, therefore the performance characteristics are very similar. They should be spaced not to exceed one and two-thirds mounting height above the work.



The following sizes are available:—

Catalogue No.	Diameter, Inches.	Depth, Inches.	Lamp Wattage.	Remarks.
970	14	11½	100-150	u/- Reflector
971	5½	11½	100-150	No Reflector
972	16	11½	200	u/- Reflector
976	18	14½	300-500	u/- Reflector
1,220	10	11	75-100	Angle type

#### DATA

For minimum foot-candles required to give satisfactory illumination for various services, see index to tables.

### WATTS PER SQUARE FOOT REQUIRED FOR DIFFERENT INTENSITIES

Intensity in Foot Candles	Type Lamp	Watts Per Square Foot With Various Types of Reflectors					
		One Row of Outlets			More Than One Row of Outlets		
		R L M Dome	Bowl	Glassteel Diffuser	R L M Dome	Bowl	Glassteel Diffuser
1	Mazda C Clear or Inside Frost	.19	.23	.22	.15	.19	.20
2		.36	.44	.43	.29	.35	.35
3		.52	.61	.60	.42	.50	.49
4		.64	.79	.78	.52	.65	.65
5		.81	.95	.93	.65	.78	.75
6		.97	1.15	1.10	.78	.94	.90
8		1.20	1.50	1.45	.97	1.20	1.15
10		1.45	1.80	1.75	1.20	1.45	1.40
12	Mazda C Bowl-Enamelled	1.80	2.15	2.10	1.45	1.70	1.70
16		2.30	2.70	2.65	1.85	2.20	2.10
1		.22	.26	.....	.19	.23	.....
2		.43	.51	.....	.35	.42	.....
3		.60	.72	.....	.49	.59	.....
4		.78	.93	.....	.65	.78	.....
5		.93	1.11	.....	.75	.90	.....
6		1.10	1.32	.....	.90	1.08	.....
8		1.45	1.74	.....	1.15	1.38	.....
10		1.75	2.10	.....	1.40	1.68	.....
12		2.10	2.51	.....	1.70	2.04	.....
16		2.65	3.17	.....	2.10	2.40	.....

### SPACING AND MOUNTING-HEIGHT TABLE

Mounting-Height Above Floor, Feet.	Minimum Spacing Distance Between Outlets. (For Plane 30 inches above the Floor)		Spacing Outside Outlets to Wall.	Mounting-Height Above Floor, Feet.	Minimum Spacing Distance Between Outlets. (For Plane 30 inches above the Floor)		Spacing Outside Outlets to Wall.
	R L M Standard Dome or Bowl Type, Feet.	Glassteel Diffuser, Feet.			R L M Standard Dome or Bowl Type, Feet.	Glassteel Diffuser, Feet.	
9	11	10	3	13½	18	16½	5
9½	12	10½	3	14	19	17	5½
10	12½	11	3½	14½	20	18	5½
10½	13	12	3½	15	21	19	6
11	14	13	4	16	22½	20	6
11½	15	13½	4	17	24	22	7
12	16	14	4½	18	26	23	7
12½	17	15	4½	19	27½	25	8
13	17½	16	5				



## DUPLEX-A-LITE FIXTURES

## Duplex-a-Lite Principle

Duplex-a-lite was designed to conform to the theory of best lighting practice based on the law of optics, and for the particular use of the most efficient of modern lamps in all sizes from 100 to 1,500 watts. The construction is such that an even distribution of light is provided with just sufficient shadow to insure a clean and distinct vision over a continuous period of time.

Duplex-a-lite has a very low surface brightness which makes it inconspicuous in a room. Yet, being self-illuminated, it satisfies the psychological demand for an apparent source of light. Light is distributed in so perfect a balance that its actual accomplishment is not immediately obvious—and appreciation grows with use.

## Construction

The construction is extremely simple and the mechanical details are handled with minute care and precision.

The standard Duplex-a-lite fastens to a ceiling with a specially designed fitting 3/4 in. running thread, nipple and brass hook with screw ring supporting canopy. This construction simplifies installation and assures perfect alignment of fixtures.

The length of chain pendant may be adjusted to support the fixture in the proper relation to ceiling. Properly focussed around the lamp is a steel deflector, finished inside in white and outside in cream vitreous enamel, which forms a circular eyeshield totally insulating the eye from the direct rays of the lamp, which are diffused in useful directions.

The dense glass disc at the bottom of deflector, acting as a filter for downward light, also diffuses light over the exterior of the deflector, thus avoiding contrast in brightness. Both the deflector and disc are supported from three flat metal hooks. The disc is easily removed for relamping and cleaning.

Duplex-a-lites are most economical from standpoint of upkeep and maintenance with lowest cleaning costs and minimum number of breakable parts.

Duplex-a-lites of special design, only one of which is shown, embody all the lighting principles of the standard Duplex-a-lite.



D 71 Design  
Duplex-a-lite.

## Standard Duplex-a-Lite, D61

The deflector is of porcelain enamel, polished white inside and matt ivory outside. Lunastone glass diffusing disc completes the glassware. This fitting is suitable for average commercial lighting and is available in the following sizes and styles:—

No.	Diameter	Lamp Wattage
D 261	14in.	150-200
D 561	16in.	300-500

Other styles are as follows:—

- D 71—Adam and Georgian Decoration.
- D 81—Floral Decoration.
- D 201—Residential.
- D 203—Residential.
- D 240—Modernistic.

## INSTALLATION DATA

The following table indicated the watts per sq. ft. to obtain various intensities with Duplex-a-lite (using lamp efficiency of 200-watt size).

Foot Candles	Small Rooms (16ft. x 16ft.) 9 to 10ft. ceilings	Medium Rooms (13ft. x 100ft.) 10-12ft. ceilings	Large Rooms (100ft. x 100ft.) 10ft. or more, ceilings
4	1.16	.86	.72
5	1.53	1.14	.96
6	1.72	1.27	1.07
8	2.32	1.71	1.44
10	2.88	2.12	1.80
12	3.44	2.52	2.15
16	4.60	3.38	2.88

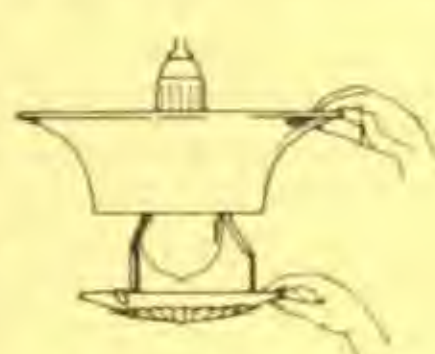
Light ceiling (70 per cent.). Medium walls (40 per cent.). Sufficient allowance has been made to cover depreciation under average conditions.

The following table indicates the spacing and mounting heights for Duplex-a-lites.

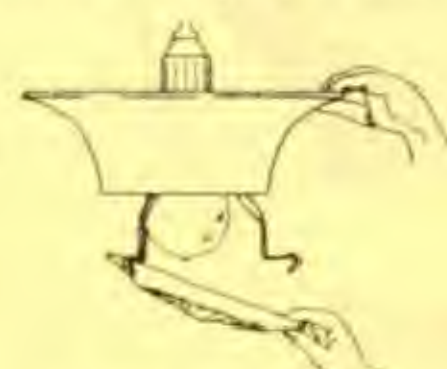
Ceiling Height, Feet.	Permissible Distance between Outlets, Feet.	Permissible Distance between Outlets and Side Walls, Feet.	Best Hanging Height, Ceiling to top of Reflector, Inches.
9	9½	5	18
10	11	5½	20
11	12½	6½	22
12	14	7	25
13	15½	8	28
15	18½	9½	32
18	23	11½	43
20	26	13	54



Principle of  
Duplex-a-lite  
Construction.



Lift Deflector and  
Hold Glass.



Spring off one hook  
and slip Disc out  
of other two.

## PRODUCTS

(For complete data on A.G.E. Products not listed here see later Pages)

## Heating and Cooking Apparatus

"Hotpoint" Irons  
"Hotpoint" Toasters  
"Hotpoint" Domestic Cooking  
Stoves  
Grillers  
Urns  
Kettles and Jugs  
Radiators  
Bain Maries  
Industrial Heating Equipment for  
Melting Pots, etc.

## Lighting

Copper-Hewitt Mercury Vapor  
Lamps  
Mercury Arc Lamps  
Street Lighting Equipment—orna-  
mental and highway  
Flashers

## Industrial Power Equipment

Australian-made AKT Motors and  
Control Gear  
Fractional H.P. Motors

## Indoor and Outdoor Switchgear

Meters and Instruments  
Arc-welding Equipment  
Oil and Air Switch Gear and Cir-  
cuit Breakers

## General

Electric Fans  
Sirens  
Washing and Ironing Equipment  
(domestic and commercial)  
Signalling Devices

(Continued on next page)



## FLOODLIGHTING PROJECTORS

## Floodlighting—An Important Factor in Modern Building Design

The Architect's experience and taste enable him to prevail over the most disadvantageous site and surroundings—to adapt his design to the conditions imposed by adjacent structures and topography, and, despite all, to impress his fabric with the effect and beauty of his conception. But he must contend with darkness. Night veils his creation—not only the fine details, but, to a large extent, the general lines—and all its grace and power are lost during the hours when most men find their only leisure to admire the art of its design and to appreciate the embodied suggestions of the purpose for which it was erected.

Illumination engineers have arrived at a system of floodlighting that literally wrests buildings and monuments from the powers of darkness; that utilises surrounding shadow to emphasise the charm and dignity of the structure; that gives nightly force to its eloquent message; that projects it against the sky and compels the admiring attention of throngs who must otherwise pass by in ignorance of its worth.

By the scientific control of floodlights it is possible either to bathe an entire building in their rays and make it a monument of white beauty or to pick out unusual architectural features for the study of those who appreciate artistic distinction. With the whole spectrum at command, tints may be introduced where they will be of effect and shadows may be cast that will give depth and significance to facade and colonnade.

These comprehensive applications of floodlighting have met such wide approval that many architects, builders, and owners are now deeply interested in designs and materials that will especially lend themselves to night illumination. Architects, in particular, are bending their talents to the incorporation of structural details that will be in artistic keeping with floodlighting developments. They are adopting hitherto unused tints of terra cotta, brick, and stone for the sake of their fine effect under the concentrated beams of floodlighting projectors. Floodlighting has become an instrument of architectural art.



A.P.A. Tower, Melbourne.  
Installation designed and  
material supplied by  
A.G.E. Co. Ltd.



Type L1 General Electric Floodlight,  
with swivel and trunnion base.

## The Manifold Uses of Floodlighting

The possibilities, and the practical uses, of floodlighting are unlimited. Following are a few of the many applications that have been made both in architectural and industrial fields:—

Monumental buildings	Towers
Business blocks	Petrol filling stations
Building fronts	Automobile show-rooms
Public buildings	Industrial plants
Athletic grounds	Grain elevators
Outdoor theatricals	Power stations
Monuments,	Construction work
Fountains, etc.	

## A.G.E. Facilities to Architects and Engineers

The A.G.E. offers the services of its lighting specialists to co-operate with architect and engineers in planning exterior or interior illumination of either new or old structures.

## Form L-9 Projector

The Form L-9 projector consists essentially of a 16-in. glass reflector coated on the outside with silver. The silver surface is hermetically sealed with a thick copper coating which obviates the necessity for an outer casing. This is secured to cast-iron frame, which also supports the lens door. The door is fastened in a closed position by means of two-hinged bolts and wing nuts. A sponge-rubber gasket between the lens and door frame renders the unit weatherproof. The cast-iron socket is adjustable and is held in place by a clamp with wing nut.

Two coats of black japan finish are given to all external parts.

There are three methods of mounting these projectors:—

1. Hinged to a flat base.
2. On turnover fastened to a swivel base. Wing nuts furnished for adjusting (see illustration below).
3. On turnover fastened to a pipe stand which is fastened to cast-iron base. Wing nuts furnished for adjusting.

Special lenses are available to further control the distribution from the reflector. These lenses are available in stippled, clear, prismatic and coloured.

## MAZDA ELECTRIC LAMPS

There is a Mazda Lamp for every purpose... from the subdued glow in the sick room to the powerful, glaring lights of commerce... for festive occasions... for spectacular displays.

Mazda Lamps, known the world over, give you not only correct light for every purpose... they give reliability, long service, and satisfaction... the results of years of research... years of work.

## Gas-filled Regular Lamps.

15, 25, 40, 60, 75 and 100 watts, with bayonet or screw caps; all voltages.

150 and 200 watt, with Edison screw or bayonet cap.  
300, 500, 1,000 and 1,500 watts, with Goliath screw caps.

Pearl Mazda Lamps are internally frosted—they diffuse the light uniformly and give a better, brighter effect, with softer shadows than clear lamps.

Available in 15, 25, 40, 60, 75 and 100 watts and any voltage.

Other Lamps are Vacuum regular lamps, Candle Lamps, Colour sprayed lamps, Daylight lamps, Neon (used either A.C. or D.C. current), etc.

(Continued on next page)



## General Electrical System

The Australian General Electric Company offers a complete, comprehensive electrical system to meet the varied requirements of present-day practices, and not merely a collection of apparatus and material. Some of the elements of the G.E. System are described in this and other pages of this Catalogue.

## A.G.E. Wiring Services

A complete range of wiring devices and accessories to suit every type of wiring requirement is stocked. A list of these devices is as follows:—

Adaptors

Mounting Blocks

Porcelain Ceiling Roses

Lampholders, brass and porcelain (bayonet, Edison and Goliath screw)

Switches (surface, flush, rotary, pull)

Complete and varied line of Flush Cover Plates

Flush Receptacles

Switch Plugs (2 and 3 pin)

Wall Plugs (2 and 3 pin) and Tops

Jamb Switches

Conduit (slip and screwed, black stove enamelled)

Conduit Fittings

British Insulated C.M.A. Wires and Cables

Metal Manufacturer's Bare Copper Cable.



G.E. 970 — 3-amp. Single Pole Tumbler Switch with Metal or Bakelite Cover.



G.E. 248 — Ceiling Switch.



G.E. Bakelite Flush Switch with Plate.



G.E. Bakelite Plate for Triple Flush Switches.



G.E. 2513 — Flush Tumbler Switch with G.E. 1701 Brass or Oxy-Copper Flush Plate.

### SURFACE SWITCHES.

G.E. Surface Switches are obtainable with metal or bakelite covers—indicating handles are standard. Available sizes are 3 amp. and 5 amp., single pole and 2-way, 10 amp. and 20 amp., double pole and 2-way.

Ceiling switches of similar construction are available in 3-amp., 5-amp., and 10-amp., 200-230 volts; 8 ft. of cord and ball furnished with each switch.

All these switches are completely insulated and are suitable for the usual building—they may be semi-recessed (porcelain portion only) into architrave, if desired.

### FLUSH SWITCHES.

G.E. fully-recessed switches or porcelain bases with insulated self-indicating handles are sturdy but inconspicuous fixtures—operate with the sweep of the finger, arm or elbow. Positive start, quick make-and-break mechanism assures smooth and positive operation and freedom from sticking or burning of contacts. Available as single-pole, 5 amp.; double-pole, 10 and 20 amp.; 3-way and 4-way.

These recessed patterns are completed with either brass or bakelite plates—combination plates with any arrangement of units can be supplied.

Use flush plate with recessed fittings in all high-class buildings.



G.E. 2853 — Combined Flush Switch and Plug, with Bakelite Cover.



G.E. Two-gang Flush Plate in Metal or Bakelite.



G.E. 2151 Flush Plate for Combination Switch, Plug and Pilot Light.



G.E. Combination Flush Switch and Plug.



31f	THE EDISON-SWAN ELECTRIC CO. LTD.				ROYAL EDISWAN LAMPS
	LAMPS - CABLES - REFLECTORS				
	S.A.A. File No.	MELBOURNE: 368 Lit. Collins St.	SYDNEY: 58 Clarence St.	BRISBANE: 156 Creek St.	

### Royal "Ediswan" Lamps

The British firm which made the first electric lamp—the Edison Swan Electric Company—offer you the lamps to solve your lighting problems in commercial and domestic buildings. In home lighting, Royal Ediswan lamps will give you the soft, warm light so essential to modern decorative schemes. Clean, soothing and gentle to the sight, Ediswan lamps are ideal for domestic lighting, especially in such rooms as the library, sewing-room and nursery, where the comfort of the sight is so important.



Gas-filled.



"Fullolite."



Projector.

### Types of Lamps Available

**Gas-filled Lamps**—Ordinary, "Fullolite," "Daylight," "Pointalite," Projector, Train Lighting.

**Vacuum**—Ordinary, Fancy, Flash, "Huntalite," "Linolite," Traction, Train Lighting.

**Miscellaneous**—Carbon lamps, motor car lamps, Miners' lamps, etc.

### Standard Caps

Bayonet, symbol B.C.; Edison Screw, symbol E.S.; Grant Edison Screw, symbol G.E.S.; Miscellaneous, for motor cars, miners' lamps, etc., also small miniature Edison Screw.

### Ordinary Gas-Filled Lamps

For all types of general service in domestic and industrial lighting, the ordinary gas-filled clear glass lamp is suitable; it has superseded the vacuum type of lamp. Royal Ediswan ordinary gas-filled lamps are available in the following sizes, etc.:—

Watts	Standard Cap	Voltage Range	Hours of Burning for One Unit
15	B.C.	25/30 up to 100/130	66.6
30			33.3
40			25.0
60			16.6
75			13.3
100	E.S. & B.C.	(Remainder)	10.0
150			6.6
200			5.0
300	E.S.	35/89 up to 200/260	3.3
500			2.0
1,000			1.0
1,500			0.66

### Fullolite Lamps

Royal Ediswan "Fullolite" lamps have bulbs made of opal glass, instead of clear glass; the opal bulb completely eliminating the glare effect usually encountered in gas-filled lamps. The surface of the opal glass being smooth and polished, does not collect dust on the bulb. Particularly suited for home and office lighting, where other than the indirect system is used. Fullolite lamps are available in the same sizes, etc., as the ordinary gas-filled lamps, up to and including 500 watts.

### Daylight Lamps

Objects observed under artificial light present a different appearance from their shades as revealed under daylight, due to the coloured rays in artificial light being disproportionate to those in daylight. By using a bulb of special colour glass, the red rays emitted by the filament are almost wholly absorbed, resulting in illumination, the properties of which closely resemble the North-sky light. Well suited for general use, especially where true rendering of colour values is required. Daylight lamps are available in 40, 60, 100, 150 and 300 watts, with standard caps and voltage range as for ordinary gas-filled lamps.

### Projection Lamps

Specially designed lamps for cinematograph and projection lanterns, flood lights, etc., where a very concentrated filament is required. The lamps are gas-filled and are the outcome of much laboratory research. Vertical tubular type (illustrated) are available in 100 to 1,000 watts, 30-260 volts. Vertical Round, "End-on" Round, low voltage projector lamps are also obtainable.



"Ediswan" Works, Middlesex, England.

### Linolite Lamps

These lamps, having filaments of drawn Tungsten wire, have been designed for use with Linolite Ediswan fittings. For pressures of over 125 volts, pairs of low voltage lamps should be used in series, these being stronger than high voltage lamps. Available in 20, 30 and 50 watts, 25-260 volts.

### Fabrolite Lampholders

Fabrolite lampholders are made particularly for use where metal lampholders are affected by chemical and atmospheric conditions. All-insulated and non-corrosive, they ensure safety in handling and simplicity in wiring. Terminals separated by dividing fillet integral with the lampholder body to safeguard against short circuit. Colour: rich brown.

(Continued on next page)



### Manufacture of Cables

Edison Swan Guaranteed C.M.A. Cables—lead-covered or bitumen sheathed V.I.R.; C.T.S.; Virite (the cable of the future); Paper-insulated, etc.—are British-made throughout. They are manufactured at Lydbrook, Gloucestershire, England, to B.E.S.A. and A.C.E.S.A. specifications. All raw materials used are analytically checked, and all cables are stringently tested at various stages of manufacture and before despatch.

### Selection of Cables

Few conductors or wiring systems have heretofore been acknowledged as suitable for all classes of installations, and as completely immune under all circumstances from the possibility of fault or breakdown; and although Virite now claims this distinction, it is as well to make a careful selection from the several wiring systems and cables now in use, and choose the one which is most suitable for the situation, taking into consideration the cost.

The chief factors to be borne in mind are (1) the special conditions which may exist; (2) the life of the system under these conditions; (3) the speed with which the system can be installed; (4) its combination with the type of equipment and apparatus it is to serve; (5) the cost of the system.

### Virite Cables

Virite is waterproof and resistant to chemical action, and very suitable for sunk or surface work. In chemical works, dye works, breweries and tanneries, for lamp standards and tunnels, for all situations where standard cables fail, Virite is guaranteed to function perfectly. Conductors are of H.C. Tinned Copper wires, insulated with special vulcanised dielectric compound of the highest chemical inertia, for working pressures up to 250 volts.

### Cab-Tyre Sheathed Cables

Conductors are of H.C. Tinned Copper wires insulated with layers of V.I.R., sheathed overall with Cab-Tyre Rubber Compound; interstices between cores filled; 600 meg. Association quality. C.T.S. wiring is small in diameter, extremely flexible, impervious to moisture, acids and alkalis, and involves the minimum amount of cutting away or preparation. The absence of metallic covering renders the earthing regulation unnecessary, and thus removes several complications and attendant costs.

### Edison Swan Lead-Sheathed Cables

Conductors and insulation as for V.I.R. cables, taped and sheathed overall with a solid tyre of lead, 600 meg. Association quality. In twin and 3-core; the cores are distinguishable. Complying in every respect with B.E.S.A. specification. Great flexibility and neat appearance make these cables particularly suitable for wiring existing and old buildings, where easy erection and unobtrusive appearance are essential.

### Prominent Users

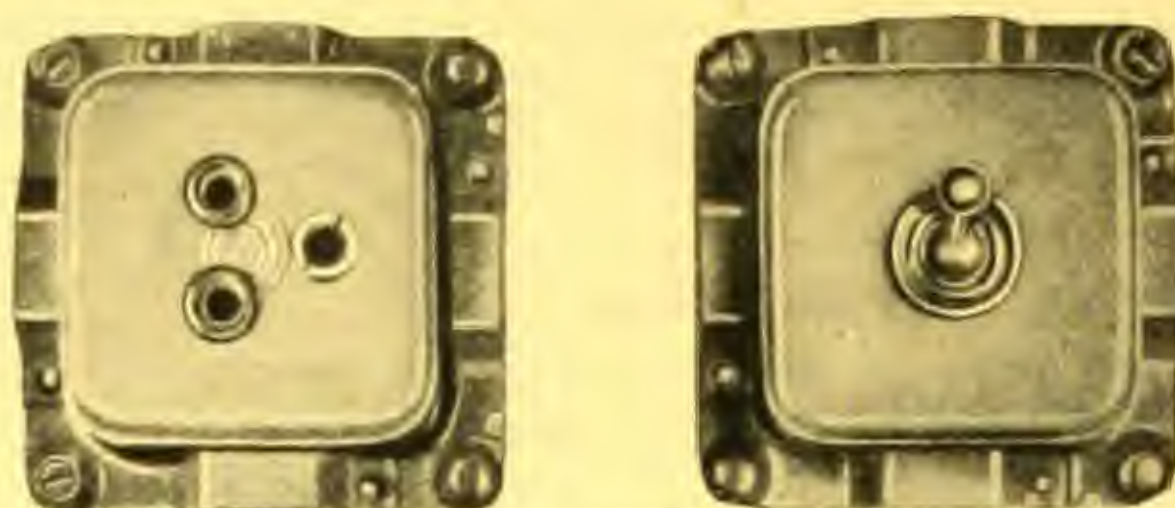
Victorian State Electricity Commission.  
The Victorian Government Railways.  
The Sydney Municipal Council.  
Victorian State Tender Board.  
Principal Supply Authorities and Industrial Companies.

### Advantages of Conduit System

The main advantages of the conduit system lies in the very definite mechanical protection it provides for the cables it carries, and it is therefore particularly suitable for industrial situations, exterior work where the weather has to be considered, for situations where the electrical system is installed during building operations, and is, therefore, permanently incorporated with the structure. A table of electrical conduit capacities, together with any other information, will be gladly forwarded.

### Edison-Swan Metal Junction Boxes

This new Edison Swan Junction Box is stamped from mild steel, tinned or copper plated with a black-bronze finish. The complete box contains only two short screws, and is extremely simple to fix. The bond is completely automatic, and allows for cables of varying diameters. The box will take two twin cables (3/.036) at each entry—back entries provided. The unused ways are closed. Can be supplied with a ceiling rose box cover with a cord grip. Buckle clips indented to provide a rigid base for the cable. Only one fixing screw is neces-



Plug Box and Switch Box.

sary for every size of clip. Combined Switch Boxes and Plug Boxes comprise Flush type 5 amp. switch or socket fitted inside the metal junction box. In each case, one cable entry cover piece is blanked to receive one twin cable up to 3/.029; thus no aperture is left around the cable, and the internal fitting is well protected, which is desirable when the boxes are accessible. Batten Holder Fittings, for low ceilings, workshops, etc., comprise flanged s/c lampholder secured to the top surface of the cover of the junction box.

## EDISON-SWAN ELECTRIC HEATING AND COOKING UNITS

### Dome Fires

The "Dome" electric fire is an apparatus which produces heat rays and nothing else, with an efficiency of nearly 100 per cent. The chief advantages are: saving of labour; instant readiness for use; longer life for decorations; perfect safety; ease of control; light weight and portability. Finished in Oxidised Brass, Copper or Silver; 100-250 volts.

### Electric Cookers

Constructed in many sizes, Ediswan electric cookers are connected by a flex to a wall plug, require no flue, and so may be placed where the light is best. Electric cooking is an exact science, done in pure fresh air, and perfect control of the radiant heat; saves 10 to 20 per cent. of the weight of the meat in cooking. The elements are trouble-proof.

### Miscellaneous Cooking Units

Boiling Plates for Cookers; Aluminium Utensils; Boiling Rings; Automatic Kettles; Toasters; Kettles. Spare Elements for all Ediswan Products are immediately obtainable from the Company.

(Continued on next page)



### Characteristics of Silverlite Reflectors

Silverlite is an all-metal reflector of maximum efficiency, composed of an electrolytic combination of copper and silver; it ensures absolutely accurate control of lighting beams. The reflecting surface is of pure silver of highest lustre, hermetically sealed against deterioration. Three distributions of light are obtainable from the same lamp, and three lamp sizes are adaptable to the same reflector. The Silverlite is extremely simple to fix—there are no springs, nuts, or screws, so that it may be instantly changed without tools. The reflector fits standard 3½-inch holders. There is no glass to break or paint to peel. The outside finish is dark statuary bronze. Alcohol or cleaning compounds should not be used on these reflectors. Remove dust with soft cotton rag. Wash any cloudy or smoky surface with ivory soap and cold water. Silverlite reflectors are **guaranteed** not to crack, peel or tarnish under normal operating conditions.

### Silverlite Selection Chart

Height in Feet		Depth in Feet					
Window	Display Surface	1-2	3-4	5-6	7-8	9-10	11-12
4 to 5	2	E-6 Z	E-6 Z				
	3	E-6 Z	E-6 Y				
5 to 6	4	E-6 Y	E-6 Y				
	3	E-2 X	E-2 X	E-2 Y			
6 to 7	4	E-2 X	E-2 Y	E-4 X			
	5	E-2 Y	E-4 Y	E-4 Y			
7 to 8	6	E-2 Z	E-4 Z	E-4 Z			
	5	E-2 X	E-2 X	E-2 Y	E-2 Y		
8 to 9	6	E-2 X	E-2 Y	E-2 Y	E-4 Y		
	7	E-2 X	E-2 Y	E-4 Z	E-4 Z		
9 to 10	8	E-2 Z	E-4 Y	E-4 Z	E-4 Z		
	5	E-2 X	E-2 X	E-2 X	E-2 X	E-4 X	
10 to 12	6	E-2 X	E-2 X	E-2 X	E-2 X	E-4 Y	
	7	E-2 X	E-2 X	E-2 Y	E-4 Y	E-2 Y	
12 to 13	9	E-2 X	E-2 Y	E-4 Y	E-2 Y	E-4 Z	
	11	E-2 Y	E-4 Y	E-4 Z	E-4 Z	E-4 Z	
13 to 15	5	E-2 X	E-2 X	E-2 X	E-2 X	E-2 X	E-4 X
	6	E-2 X	E-2 X	E-2 X	E-2 X	E-4 X	E-4 X
15 to 16	7	E-2 X	E-2 X	E-2 X	E-2 Y	E-4 X	E-4 Z
	8	E-2 X	E-2 X	E-2 X	E-2 Y	E-4 X	E-4 Z
16 to 18	10	E-2 X	E-2 X	E-2 Y	E-4 Z	E-4 Z	E-4 Z
	12	E-2 X	E-2 Y	E-4 Z	E-4 Z	E-4 Z	E-4 Z
18 to 20	14	E-2 Y	E-4 Z	E-4 Z	E-4 Z	E-4 Z	E-4 Z

NOTE.—E-5, not shown in this chart, is for placement above glass ceilings and for other special purposes.

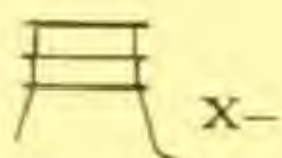
### How to Select Correct

#### Types

Example:

Window Height . . . 8 ft.  
Display Height . . . 5 ft.  
Depth of Window . . 4 ft.

Find 8 feet in first left-hand column. In next column to right, the display height, 5 ft. Follow through this space to right to column headed 4 feet. At this juncture is given the number of correct Silverlite and proper collar position to use in this example: E-2 X; i.e., reflector E-2, collar position X.



X—



Y—



Z—

Collar Positions.



E-2.



E-4.



E-5.



E-6.

### Ceiling Rings

Ceiling Rings for flush-mounting Silverlites E-2, E-4, E-5, are available in two types:—

- For Plastered Ceilings.—One-half (A) of ceiling ring is set in wire lath and plastered in, and the other half (B) is applied after reflector is set in position.
- For Wood and Composition Ceilings.—For Silverlites E-2 and E-4, the part (B) of the ceiling ring, as used for plastered ceilings, is used. For Silverlite E-5, a rolled brass ring is available for fixing.

### Permanent Glass Colour Media

Media are available in the following colours:—Flame Red, Royal Blue, Tin Green and Golden Amber.

These colour media are easily attached, fitting directly over the lamp bulbs, and are not affected by heat.

### Frink Spring Grip Holder, for Gelatin Colour Frames

Frink Spring Grip Holders are held to the reflector at three points; the best quality low-loss gelatins being available in Red, Blue, Green and Amber.





## THE LIGHTING SERVICE BUREAU of PHILIPS LAMPS (A'SIA) LIMITED

HEAD OFFICE—69-73 Clarence Street, Sydney. - - - - - BW 2121.  
BRANCH OFFICES—354 Post Office Place, Melbourne. - - - - - M 3191.  
Wyatt House, Grenfell Street, Adelaide. Central 6843.  
Perry House, Elizabeth Street, Brisbane. - - - - - B 7462.

31f

S.A.A. File No.

### ILLUMINATION ENGINEERING DATA

#### Fundamental Principles of Light and Sight

Light is that form of energy which by its action upon the organs of vision enables them to perform their function of sight.

The influence of artificial light is experienced in many ways. In the first place, light lends character to our surroundings, and is a factor in the creation of moods or what we more commonly describe as "atmosphere." Popular instances of this are given in the methods of lighting churches, theatres or restaurants.

The influence of light, however, becomes more noticeable in its power to enable us to distinguish objects and perceive detail.

Where the creation of atmosphere is the chief consideration, the efficiency of the lighting source is of secondary importance; but where lighting is to be used as a means of distinguishing, the primary importance is to get as much out of the lighting source as we possibly can.

Now, in order to get the best out of our lighting, it is necessary that we (1) appreciate the physical act of seeing; (2) understand what the seeing requirements are in individual cases; (3) have a knowledge of light adaptation in conjunction with the placing, spacing and mounting of light sources, together with reflecting or diffusing methods to be employed for any desired result. The two latter points will be dealt with under three general headings, but we may here briefly review the first point.

Light is largely based on the varying reflective capacities of the objects which come within the range of vision. This variation must be preserved, particularly in the case of objects of one or no colour, as if the light intensity is the same on every particle of surface area, there would be no contrast, without which the eye would be unable to distinguish form, shape, or detail.

#### Denomination of Units

(a) The Unit of Luminous Intensity is called a "Candle" (one candlepower).—In the case of a "uni-

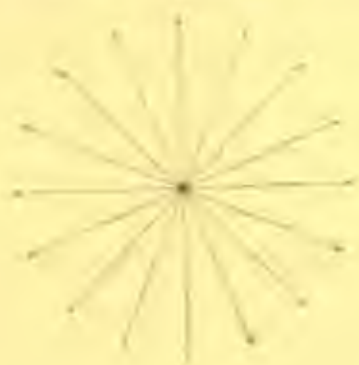


Fig. 1.



Fig. 2.

form" source of light (glowing bulb), the luminous intensity is the same in all directions (see Fig. 1). The

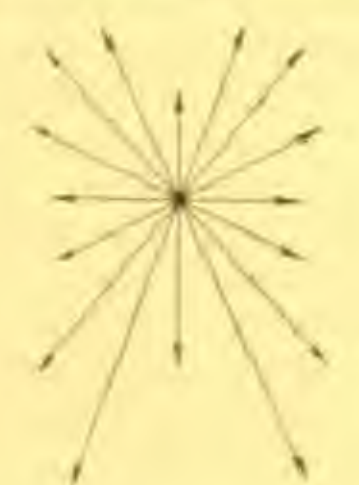


Fig. 3.



Fig. 4.

arrows indicate a number of candles. In this case the arrows are the same length, therefore the luminous intensity is the same in all directions.

Now we can connect the arrow heads in a curved line, which, in the case of Fig. 1, becomes a circle (Fig. 2).

In the case of some incandescent lamps, the luminous intensity is not equally strong in all directions, but show uneven emission (see Fig. 3). A curve of this light emission is shown in Fig. 4.

(b) **Lumen.**—The lumen is the unit of light flux. It is the total amount of light intercepted by a surface of one square foot, every point of which is at a distance of one foot from a point source having an intensity of one candle. The total flux emitted from a uniform light source of one candle is 12.57 lumens.

(c) **Foot Candle** is the unit of intensity of illumination. When one lumen falls on an area of one square foot, the average of intensity on that plane is one foot candle.

The farther away from the light source a plane is held, the smaller becomes the intensity of illumination, which diminishes in proportion as the square of the distance.

(d) **Coefficient of Utilization.**—This is the proportion of the lumens produced by the lamp which reach the plane of work. It takes into account the losses due to light absorption on the walls, ceiling, and fitting used.

(e) **Depreciation Factor.**—This is the factor which allows extra initial illumination to compensate for the falling off in reflecting efficiency of the reflectors, walls, and ceiling, due to deterioration and the collection of dirt and dust. A depreciation factor should always be applied, since calculations for lighting are made for ideal conditions of cleanliness, service, etc. At the same time, it must always be borne in mind, that such a factor does not allow for inefficient maintenance.

#### Foot-Candle Measurement



The light emitted by the lamp may be described as "raw light," and must not be confused with the effective illumination that is required at the working point.

The user of light is not so much concerned with the candle power of the light source, as the resultant illumination on the desk, counter, or machine.

Illumination can now be as readily measured as the temperature of a room, the unit of measurement being the foot-candle, and the instrument the Philips Foot-candle Meter. This portable meter is a small pocket-size instrument, having an illuminated calibrated scale from which foot-candle reading may be directly taken. The scale illumination is by means of a small lamp contained in the meter, and accurate readings are taken by comparison of illumination through punched holes in the scale. Even in the case of low intensities of 0.4½ foot-candles, these can be just as easily read on the scale as intensities of 60 or 80 foot-candles.

(Continued on next page)



## ILLUMINATION ENGINEERING DATA (Continued)

## Distribution Curves

Under the heading "Luminous Intensity" we show that, in the case of an ordinary incandescent lamp, the amount of light emitted is not the same in all directions (see Fig. 4). In this case the "distribution curve" of an incandescent lamp is shown. Generally, however, we indicate this curve by the right-hand half only, and

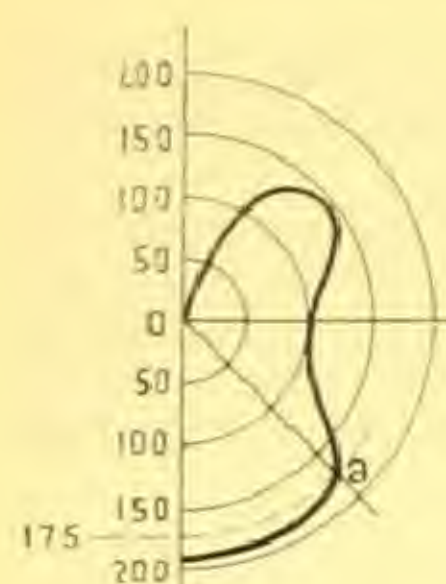


Fig. 6.

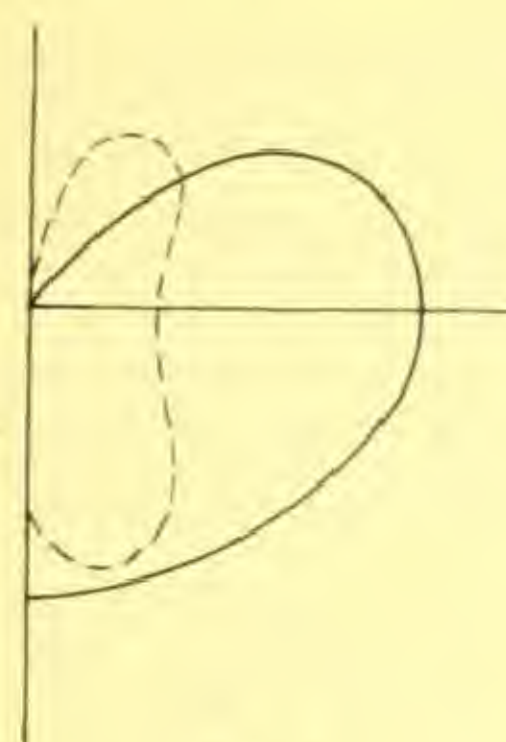


Fig. 7.

without the arrows shown in our drawing (Fig. 4). In Fig. 6, we read in direction "a" a luminous intensity of 175 candles. If an incandescent lamp is hung in a fixture or an ornament, or is mounted in a frame or a bowl, then generally speaking, the radiation from the fixture, etc., will no longer be the same as the radiation from an incandescent lamp. The distribution curve of the fixture, etc., is now indicated as follows:—

The dotted line is the distribution curve of the lamp; the continuous line is the distribution curve of the fixture (Fig. 7).

According as the radiation from the lamp is modified in some way or other by the lighting fixture, we get entirely different modes of radiation, which are shown by means of curves. This question can now be dealt with under the heading of Methods of Lighting, wherein we may observe different curves resulting from the use of various luminaires or reflectors and their selection for the four main lighting methods.

## Methods of Lighting

## 1. Direct Lighting.

In the case of direct lighting the light from the incandescent lamp is either for the greater part or entirely directed downwards.

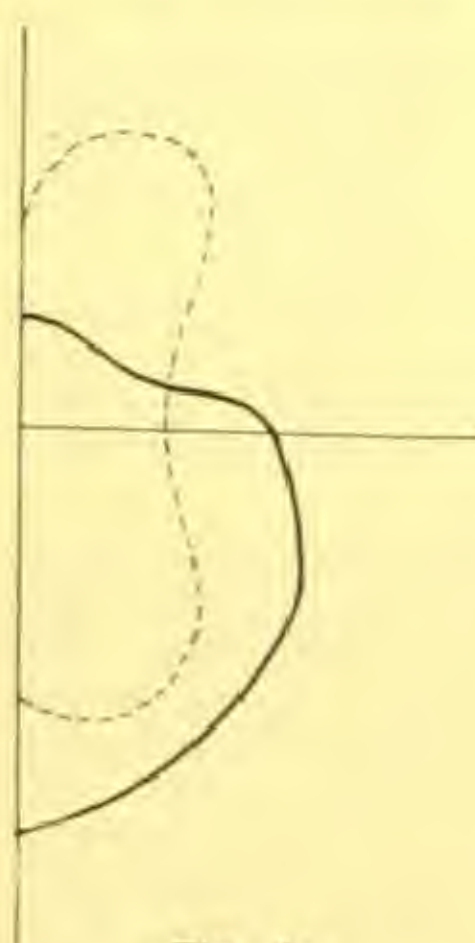


Fig. 8a.

(a) It is directed downwards for the greater part when a small portion of the light proceeds upward (see Fig. 8a). This is the case with the so-called "direct interior fittings," "Phililux" G. A. D. (top of globe opalized, bottom satinized). Here the light falls direct on the objects in use on the working plant, causing a fair amount of shadow. By the portion that goes upwards the shade or the ceiling is slightly illuminated. The same thing happens in the case of the exterior fittings with the opal reflectors (Philulux NA).

(b) All the light is directed downwards (see Fig. 8b). This is the case with all fixtures with enamelled reflectors

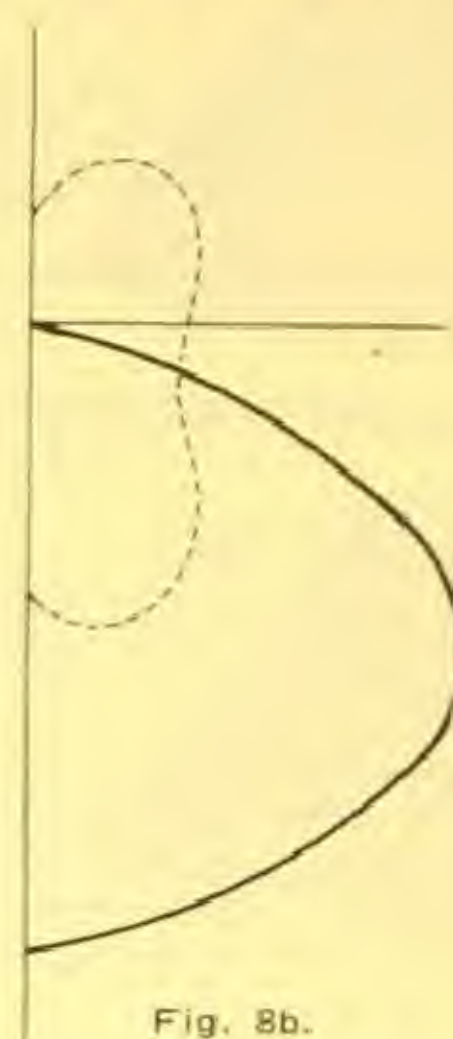


Fig. 8b.

above the frame (generally the ceiling or roof), owing to the nature of which the light is directed downwards entirely diffused (see Fig. 9). By this means the light received below is of a purely diffused character, and the illumination becomes almost shadowless. This result is obtained by means of the interior fixtures "Phililux G.A.L.," or by lamps in cove frames.

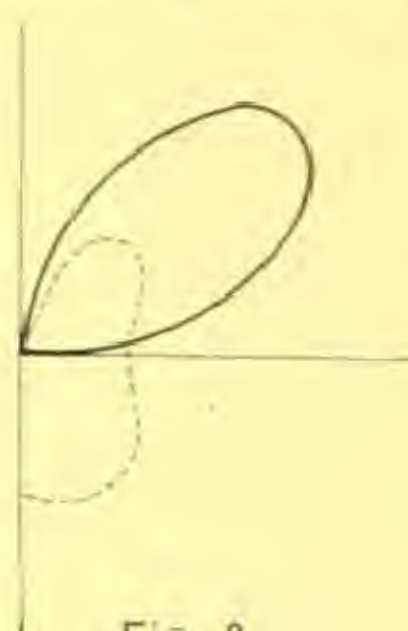


Fig. 9.

## 3. Semi-Indirect Lighting.

This keeps the mean between 1 and 2. The greater part of the light is directed upwards; part of it goes straight downwards (see Fig. 10). This is achieved by means of Phililux G.A.H. Unit.

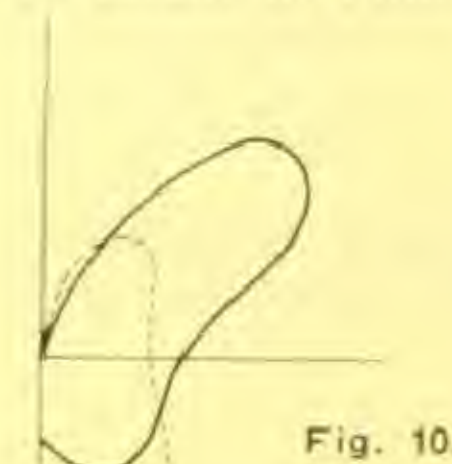


Fig. 10.



Fig. 11.

workshop fixtures, N.R. lamps with bowl reflectors, etc. (See Philuma and Philulux series.) Here the shadow effect is even stronger than with the method "a."

## Applications—

For "a": Dustless factory spaces, lofty halls, churches, staircases.

"b": Factories, street lighting, railway yards, platforms.

## 2. Indirect Lighting.

The light is sent exclusively upwards. In this case, there must be a reflective surface above the fixture or above the frame (generally the ceiling or roof), owing to the nature of which the light is directed downwards entirely diffused (see Fig. 9). By this means the light received below is of a purely diffused character, and the illumination becomes almost shadowless. This result is obtained by means of the interior fixtures "Phililux G.A.L.," or by lamps in cove frames.

## Applications—

Draughting rooms, operating theatres, picture galleries, residential.

The principal flux of light going upwards, the result is the same as in the case of indirect lighting—that is to say, almost shadowless. The small portion of light that goes downwards causes just a little shadow effect, which, in most cases, is necessary.

## Applications—

Offices, schools, large stores, some factory workshops.

## 4. General Diffused Lighting.

Here the light is diffused by the fixture as much as possible, and for a great part directed downwards, while a considerable portion also spreads upwards and to the sides. This is the correct type of lighting when the principal effect is required immediately under the lamp and the surrounding spaces have also to be sufficiently well illuminated.

(Continued on next page)



## ILLUMINATION ENGINEERING DATA (Continued)

**Residential Lighting.**

Obviously, so extensive a subject cannot be fully dealt with in a catalogue such as this, but we may at least review some of the errors to be avoided and the advantages to be followed.

The main features in home lighting are:—First, the provision of sufficient illumination to permit working in comfort in every room. Secondly, the inclusion of an adequate number of lighting points placed in convenient and accessible positions, so that, by means of "flexibles," light may be added as a furnishing or part of a decorative scheme or used for any local purpose. Three or four points, in addition to permanent light sources, are by no means too many.

**Glare.**

Glare is the effect created by the exposure of the eye to a bright light source. This can be easily avoided by using correctly designed fittings or obscured lamps.

**Shadow.**

Clear lamps, used without proper shades and fittings, cause harsh shadows, making work difficult and spoiling artistic effects.

**Location.**

The location of fittings should be carefully studied, since wrong location limits lighting value, and may produce annoying shadows.

**Quantity of Light.**

Insufficient light is known to cause eyestrain, besides giving a dull and gloomy appearance in the room. Refer suggestions given for various rooms.

**Quality of Light.**

Obviously, a kitchen needs an entirely different quality of light from that of a drawing-room. In the former, a bright light on the working plane is required, and, in the latter, soft mellow light is more appropriate.

**Flexibility.**

The flexibility of a lighting system adds greatly to comfort, convenience and utility. The installation of wall plugs in every room permits the use of wired furniture, table and floor standard, so that light may be used where required, thus making light the servant, and not the master. Wall plugs, also, facilitate the use of domestic apparatus, such as toasters, kettles, vacuum cleaners, etc.

**Lamps and Fittings****Types of Lamps.**

Electric lamps are divisible into three main classes, viz., carbon, vacuum, and gas-filled.

The carbon lamp is not suited for domestic illumination, as it consumes a large amount of energy, and gives only a poor light in return.

The vacuum lamp is more efficient than the carbon lamp, and is available in sizes from 15 to 60 watts. The vacuum lamp should not be employed for lighting the important rooms in a house, as the more recent gas-filled lamps are more efficient for this purpose. The chief application of the vacuum lamp is only where the number of burning hours is small and the lower cost of a lamp is a more important consideration than the small amount of current consumed.

The gas-filled lamp is the latest and most efficient type of lamp yet developed. Its filament, which is spiralized, is operated in a bulb with inert gas, and consequently a higher degree of incandescence is reached, with the result that more light is obtained from the lamp. The gas-filled lamp, by reason of its spiralized filament, is liable to be a source of glare, and so a number of improvements have been introduced into the manufacture of this lamp to obviate this defection. These consist principally of obscuring in some manner the clear glass of the bulb so that diffusion takes place.

The newest and most satisfactory type of obscured gas-filled lamp is the Philips Argenta. This lamp has a bulb consisting of two thin skins of glass, the inner of clear glass and the outer of opal glass. The effect of this process is to diffuse the light over the whole surface of the bulb, resulting in a great reduction of glare and the elimination of harsh shadows.

The Inside Frosted, or Arlita Pearl Lamp, represents the latest development in lamp manufacture, diffusion being obtained by frosting the inside surface of the bulb. This not only ensures diffusion with a small light absorption of two per cent., but leaves the natural polish on the outside of the bulb, thus reducing the accumulation of dirt and facilitating cleaning. These lamps can be safely used to replace clear lamps in every instance. Note.—Inside frosted lamps are not supplied over 100 watts.

Clear gas-filled lamps are used for general purposes, also in inverted bowls of the semi-direct type, or, in the latest types of totally enclosed three-ply glass luminaires.

The high intrinsic brilliance of the filament makes it always advisable to use clear gas-filled lamps in luminaires or fittings which serve to screen the eyes from the glare of the filament, and which also serve to diffuse the rays emitted from the lamps.

The Daylight Blue Lamps may be used, in some cases, where a cool effect is desired. This lamp has a selectively tinted blue glass bulb, which filters out the excess red rays, so that the light emitted approximates that of natural daylight; thus a lamp of this type is to be recommended for sewing rooms, sun porches, etc.

**Size of Lamps.**

Since helpful advice cannot be complete without some indication of the types and sizes of lamps suitable for various fittings, the following suggestions as to general types of lighting equipment, together with the lamps necessary for their proper use, should prove of value. Although it is impossible to give intensity tables for lighting the home, some general recommendations can be made.

**Halls.**

A lamp wattage equivalent to not less than one-half the floor area in square feet is recommended.

Types.—Where the lamp is obscured, either clear gas-filled or Arlita Pearl; where the lamp is visible, the Argenta.

For some hallways the use of the Duo-Savelite is to be recommended. This type of lamp, which has a double filament, may be switched down by means of a contrivance in the cap, thus reducing the normal burning of 25 watts to a dim light of 4 watts. It should be noted that, on the 4-watt filament, this lamp takes 250 hours burning to consume one unit of current.

Types of Diffusers.—Any of the Phil-Lite range may be recommended for this purpose, but perhaps the D.A. or D.C. types are the most suitable in design. These units may be supplied either with Florentine bronze suspension chain, or with oxidised brass canopy for direct attachment to the ceiling.

**Dining Room.**

For general lighting, the lamp wattage should not be less than the area of the room in square feet. For three-light dining table



(Continued on next page)



## ILLUMINATION ENGINEERING DATA (Continued)

pendants, use 40-watt Arlita Lamps. Where inverted bowls are used, clear gas-filled lamps of not less than 100 watts are most suitable. For enclosed luminaires, Arlita Pearl, Clear Gas-filled or Daylight Blue Lamps are to be recommended.

Diffusers.—Phil-Lite diffusers, type according to choice.

**Drawing Room.**

For general lighting a total lamp wattage equivalent to from half to three-quarters of the floor area in square feet for rooms of medium colourings.

For dark walls, one watt per square foot should be provided. Floor standards and table standards should be equipped with Argenta, Arlita or Natural Colour Gas-filled Lamps.

Where wall brackets are used, Natural Colour Argenta or Arlita Lamps of 40 or 60 watts, according to the size of the room, under silk or parchment conical shades.

Diffusers.—Any of the Phil-Lite range are suitable, but we would specially recommend the D.A. or D.E. types for this purpose. In the case of extremely large rooms, the D.G. type may be shown to advantage.

**Bedrooms.**

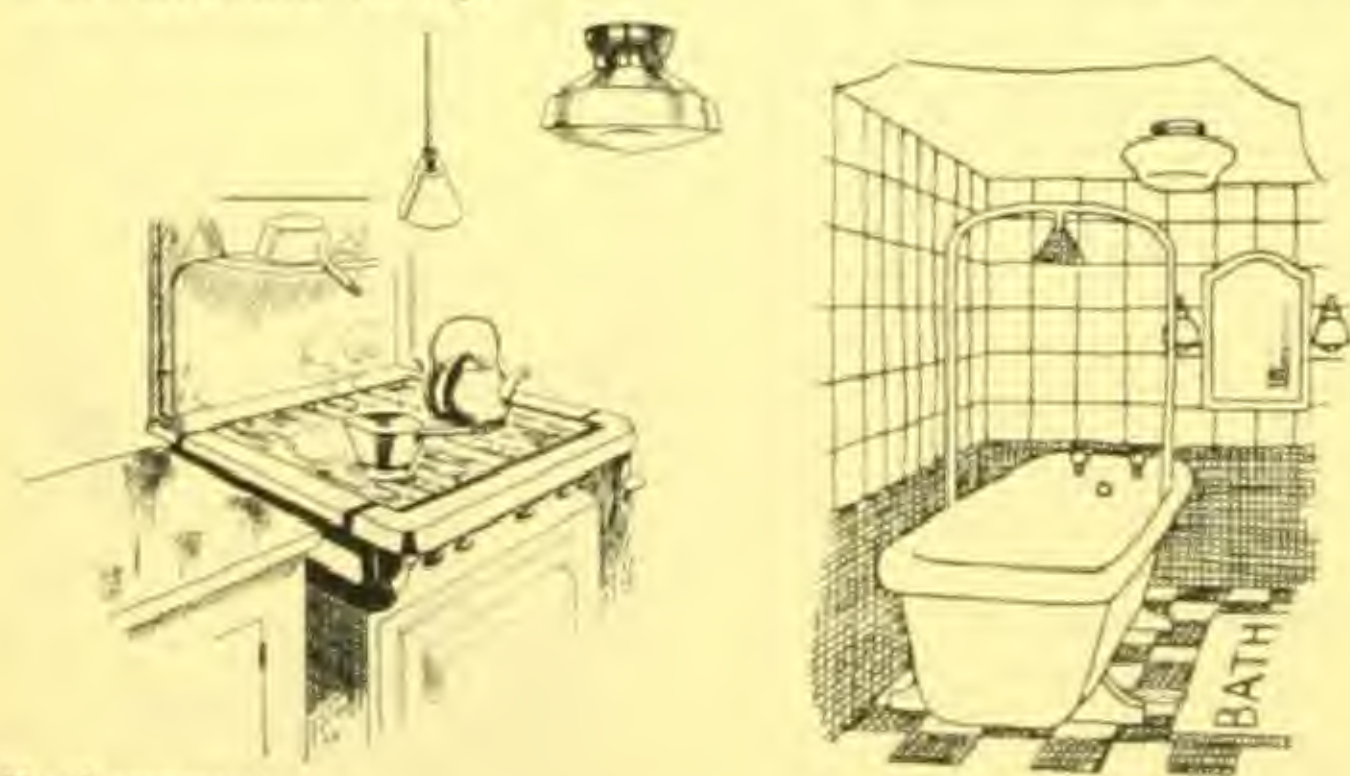
Bed brackets, table standards and dressing-table brackets should be fitted with Argenta or Arlita Lamps of 40 or 60 watts. If a central fitting for general lighting is provided, a 100-watt gas-filled lamp will suffice.

Diffusers.—According to selection.

**Kitchen.**

For central lighting in the kitchen use a lamp wattage equivalent to approximately three-quarters of the floor area in square feet. For example: In a kitchen 10ft. x 13ft., the floor area is 130 square feet. The recommendation for this room is a lamp wattage equivalent to three-quarters of the floor area and the nearest standard size is 100 watts. For lighting the cooking range, the Philips White Enamelled K.R.D. Reflector should be used to house either a 40-watt Arlita Pearl or Daylight Blue Lamp. A similar fitting, using either of the types of lamps mentioned, should also be installed over the mixing slab or draining board.

Diffusers.—Phil-Lite type specially recommended is the D.E. or D.B. type, with oxidised brass canopy attached direct to the ceiling. Another good lighting unit for the kitchen is the P.A. 16 type ceiling flange of white porcelain, used in conjunction with a 75 or 100-watt Argenta Lamp.

**Bathroom.**

Use a lamp wattage equivalent to approximately one-half of the floor area in square feet. Forty-watt

minimum for central lighting lamp should be used in conjunction with the P.A. 16 type ceiling flange, using an Argenta Lamp.

Where an enclosed glass luminaire is used, the Phil-Lite D.E. type should be recommended, in conjunction with a 75-watt Arlita Lamp.

Please note that wattage of lamp should be governed by the floor area. Further, it is not desirable to use a lamp of less than 75 watts with an enclosed luminaire.

Over the shaving cabinet a 40-watt Arlita Pearl or Daylight Blue Lamp should be used, in conjunction with a K.R.B. Reflector.

**Influence of Interior Finish on Illumination.**

Lamps are frequently blamed for disappointing lighting effects, whereas the result is often due to the dark surroundings of the room. A larger lamp should be used in rooms with dark decoration than is necessary where light or medium colourings are employed.

When painting or papering the various rooms in the home, some knowledge of the reflecting powers of different coloured walls is useful. As much as 80 per cent. of the light falling on the dark walls and ceilings may be absorbed.

**Hall Fittings.**

Fittings for the porch, the ceiling unit and hall: Arlita Pearl Lamps. For enclosed fittings: Argenta or coloured lamps in units with clear glass sides.

**Standard Lamps.**

Use a 40 to 60-watt Argenta or Natural Coloured Gas-filled Lamp in table standards, lighted ornaments, wall brackets, bed brackets and wardrobe.

**Candle Fittings.**

For candle fittings use 25 watts plain or twisted flame candle lamps. For large fittings, plain Argenta type lamps can sometimes be adopted.

**Electrolier.**

Where an electrolier is used in the drawing-room, recommend 40 to 60-watt Arlita or Argenta Lamps.

**Inverted Bowls.**

Remembering that the inverted bowl is used rather more as a reflector than as a diffuser, it is always desirable to use clear gas-filled lamps of higher wattage than would be necessary in an enclosed luminaire.

**Entrance Porch.**

A porch light should be used, and, if possible, designed to fit flush to the ceiling. The Phil-Lite D.H. type spherical luminaire is ideal for this purpose, and should be used in conjunction with a 60-watt Argenta Lamp. As an alternative, an antique lantern is frequently used. For this purpose, recommend the Philips Natural Coloured Amber Lamp of 60 watts.

**Verandahs.**

For permanent verandah lighting, recommend the Phil-Lite D.E. type, with a 60-watt Arlita or Daylight Blue Lamp. Alternatively, recommend the P.A. 16 ceiling flange, used in conjunction with 60-watt Argenta Lamps.

The P.A. 16 ceiling flange permits the substitution of Philips Natural Coloured Gas-filled Lamps for verandah decoration at festive occasions.

**A FEW NOTES ON SPECIAL TYPES OF LAMPS.**

**Clear Gas-filled.**—The Philips Clear Gas-filled is much to be preferred over the old vacuum types, and can be safely recommended in all places where the lamp is totally obscured.

**Arlita Pearl.**—The Arlita Pearl is the Philips inside frosted lamp, and can be used in all places where total obscurity of the lamp or filament is not obtained. This lamp is particularly recommended for use inside an enclosed luminaire, as, because of the inside frosting, the filament of the lamp is not visible through the glass of the luminaire.



## ILLUMINATION ENGINEERING DATA (Continued)

**Arlita Pearl Lamps** of low wattage are also entirely satisfactory for use in lamp standards, wall brackets, electroliers, etc.

The **Argenta** is a two-ply glass lamp, that is to say, an ordinary clear glass gas-filled lamp, having a thin skin of opal superimposed upon it. The Argenta represents the ideal in sheer lamp diffusion, and may be recommended for use in all places where it is not possible or desirable to obscure the lamp.

The **Daylight Blue** may be recommended particularly for all places where it is desirable to get a light emission closely approximating daylight. Thus, for use over the ironing board, over the cooking range, and in the sewing room, the Daylight Blue type provides a very happy addition to comfort in the home. Because of the sense of coolness experienced where this type of lamp is used, the Daylight Blue should be recommended for all positions where heat or stuffiness obtain.

**Duo-Savelite**.—This lamp is, perhaps, one of the most unique contributions to the householder. Normally, it provides a 25-watt light, its bulb of Argenta glass giving a very pleasing diffused light. By means of a switching arrangement in the cap, the lamp may be quickly changed over to four watts. One of the difficulties in the use of electric light in the past has been the impossibility of turning it down. The introduction of this lamp provides a happy solution to that difficulty—in the sick-room, the nursery, the porch, hall, stairway, in fact, in all places where it is desirable to leave a dim light burning for any length of time.

**The Crucia Lamp**.—In those homes where an altar or a shrine is installed for devotional purposes, the Crucia Lamp provides a very chaste religious symbol. By means of a Neon plate an outline of a cross gleaming blue and red is enclosed within the glass bulb of the lamp. This lamp will find a ready reception, not only in private homes, but in chapels and hospitals, and other religious institutions.

**Natural Coloured Lamps**.—The addition of these lamps for interior home decoration has found a ready response among the more artistic home-makers. For use under coloured shades to match furnishings or colour schemes these lamps may be provided in red, blue, green or amber.

**Philips Candle Lamps**.—These lamps, used in bracket fittings or chandeliers, lend a wealth of charm and beauty to the home.

The **Candelabrum Lamp** is a complete candlestick, which may be used with an unique Philips fitting, and is available in blue, green or red shades.

#### Flame Coloured Twisted Candle Lamps.

This new type of candle lamp lends itself for general home decoration in some chandeliers, wall brackets, or in any place where it is not desired to use a shade over the lamp.

#### Illumination Sets for Home Decoration.

This lighting outfit consists of a string of sixteen olive-shaped coloured lamps, and is sold complete with holders, two spare lamps and special safety plug. The lamps,

which are wired in series, are thoroughly weatherproof, and are specially suitable for decoration in the home, at birthday parties, balls, and other festive occasions.

Lamps of this type are particularly suited for Christmas tree decoration, and, indeed, on all occasions where colour and light may be used for decorative effect.

### Commercial Lighting

#### Department Store Interior.

The type of fitting selected will depend on the method of lighting decided on. (Refer Methods of Lighting.)

Except in cases where purely decorative effect is required, the totally enclosed lighting unit is to be preferred. New Philips equipment makes it possible to use enclosed units, whatever method is selected. Under the heading of "Equipment" we illustrate a series of modern designs, which are applicable to various locations, making provision for artistic effect, while retaining as a basic principle maximum effective illumination, combined with economic service.

The totally enclosed units offered are of three-ply glass, having an absorption factor as low as eight per cent., and because of the restraint and simplicity in design, are ideally suited for interior store lighting.



#### Service to Architects.

Every individual lighting specification presents its own problem, and it is impossible to set down here any set principles without going very fully into the question of calculations, some of which are very involved. Realising these difficulties, and the time required for their solution, the Philips Lighting Service Bureau offers the services of their own Illumination Engineers, who will assist in the compilation of specifications, giving technically correct information concerning the spacing, mounting heights, etc., of various units at any particular location, in order to obtain a predetermined foot-candle illumination.

(Continued on next page)

### LIGHT AND COLOUR EFFECTS

COLOUR OF LIGHT FALLING ON THE OBJECT						
Natural Colour of Object	Red	Orange	Yellow	Green	Blue	Violet
RESULTANT COLOUR APPEARANCE						
Black	Reddish-Black	Orange-Black	Yellow-Black	Greenish-Black	Blue-Black	Violet-Black
White	Red	Orange	Yellow	Green	Blue	Violet
Red	Red	Scarlet	Orange	Brown	Purple	Reddish-Purple
Orange	Orange-Red	Orange	Yellow-Orange	Greenish-Yellow	Violet-Brown	Red
Yellow	Orange	Yellow-Orange	Yellow	Yellowish-Green	Green	Reddish-Brown
Light Green	Reddish-Grey	Yellow-Green	Greenish-Yellow	Green	Blue-Green	Light-Purple
Deep Green	Reddish-Grey	Rusty Green	Yellowish-Green	Green	Greenish-Blue	Greenish-Purple
Light Blue	Violet	Slate Grey	Yellowish-Grey	Greenish-Blue	Blue	Violet-Blue
Deep Blue	Purple	Bluish-Grey	Slate	Blue-Green	Blue	Blue-Violet
Violet	Purple	Red-Purple	Violet-Grey	Blue	Violet-Blue	Violet

The above table indicates the appearances of coloured objects when subjected to different coloured lights.

(Continued on next page)



## ILLUMINATION ENGINEERING DATA (Continued)

This is a very special service, of which Philips are justly proud, and architects and engineers are urged to avail themselves of it to the fullest extent.

**The Shop Window.**

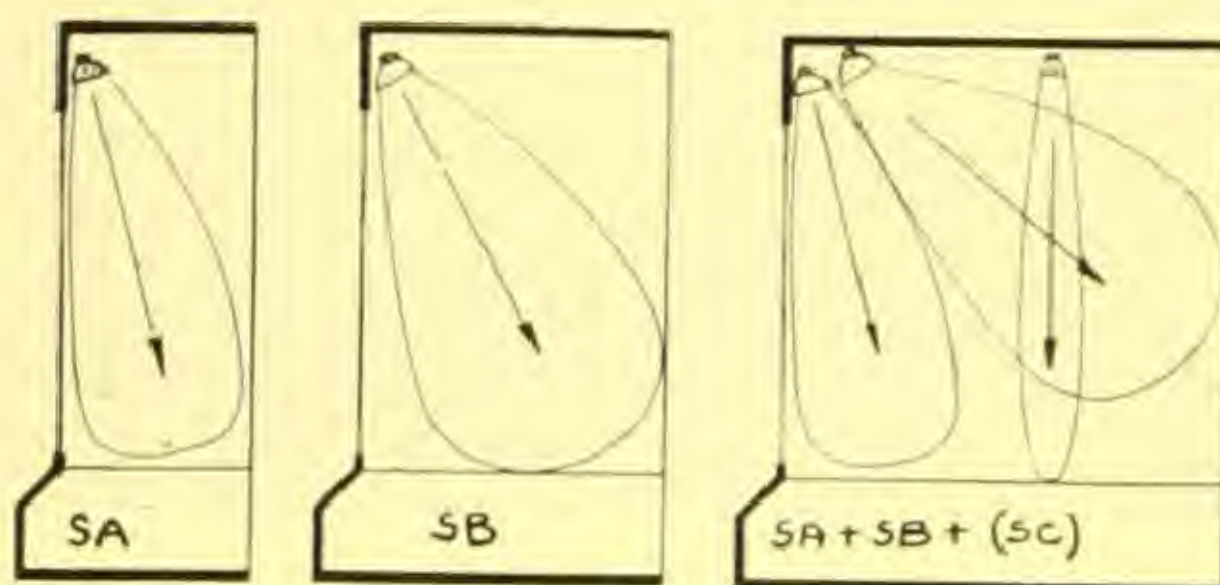
The remarks given under "Service to Architects" also apply to shop window lighting. We can, however, discuss this question and give a broad outline of the requirements and a general table for average window lighting.

It is not generally realized that a window can be superbly lighted for quite a small outlay; on the other hand, the use of inferior reflectors, wrongly placed, can result in loss in efficiency, glare and high current consumption.

The primary object is to light the display, and so to control the light with reflectors that none is wasted or permitted to strike the eye of the onlooker.

The high intrinsic brightness of the gas-filled lamp necessitates its being shielded from the direct line of vision, for, otherwise, the glare experienced by the onlookers neutralizes its power to reveal the details of the display. It is essentially for this reason that the modern method of lighting windows from concealed sources has been developed. The old system, employing pendants, often with bare lamps, is extremely wasteful, only one-third of the light illuminates the goods, the remaining two-thirds being sent out of the window to afflict the eyes of the observer with glare.

Under the heading "Equipment" we give constructional details of the four different types of window reflectors which comprise the Philiray series. This series covers all practical purposes in window lighting, each unit being designed to give a special light radiation (see illustration).



Type S.A. radiates the bulk of the light vertically downwards (shop windows of small depth).

Type S.B. radiates the light more obliquely downwards (shop windows of greater depth).

Type S.C. gives a highly concentrated beam (concentrated local lighting).

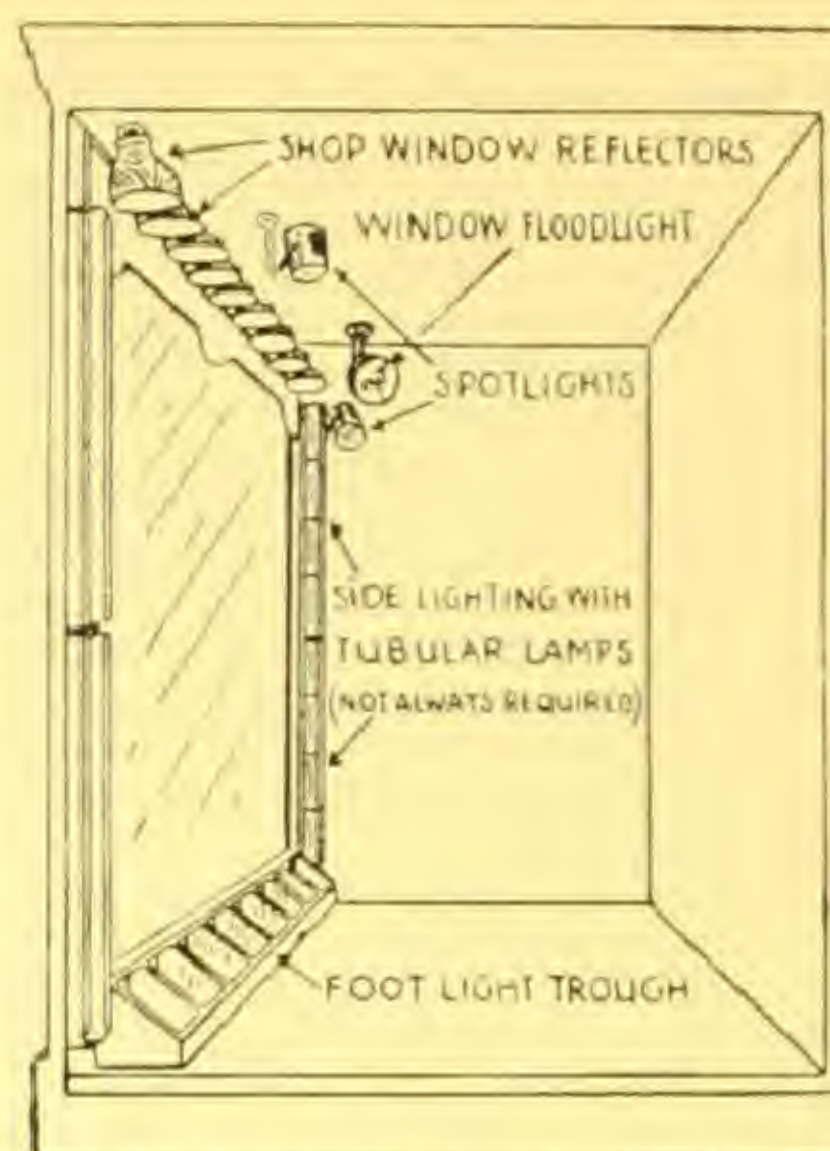
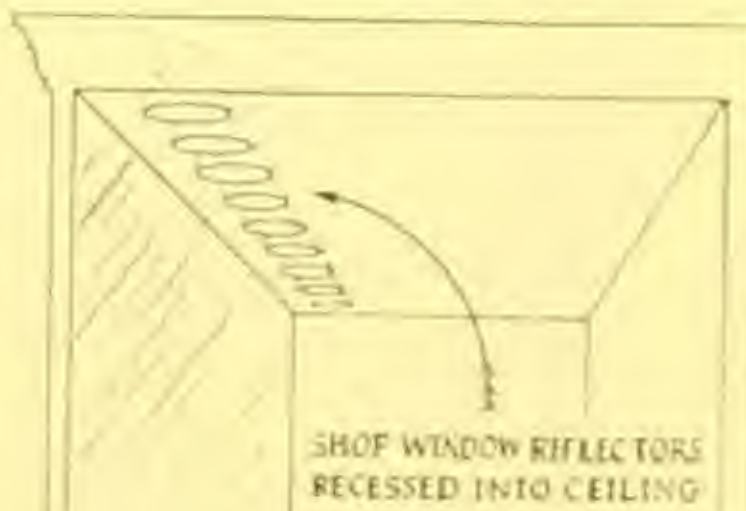
Type S.D. is a particularly small type, for use in all cases where little space is available.

For colour installations a special screen is made to fit over the reflector.

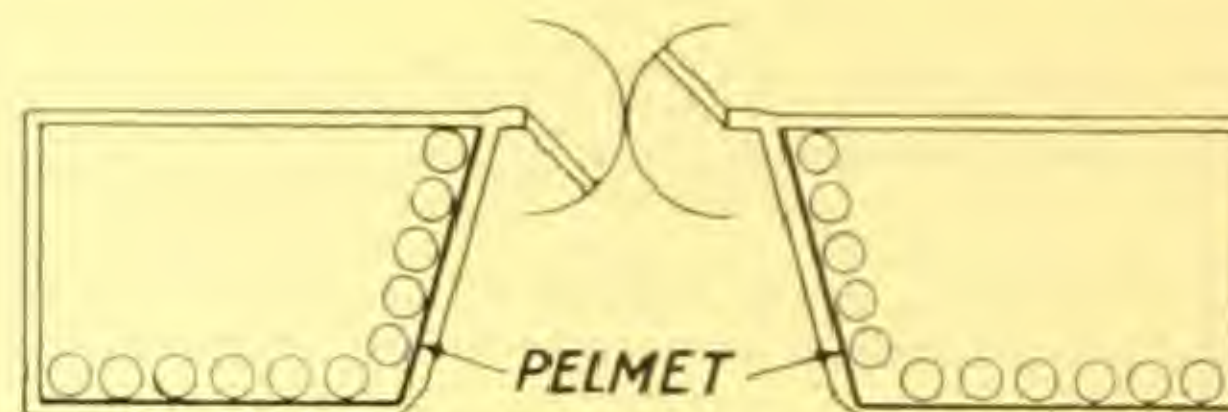
**Footlights and Sidelights.**

In general, windows can be adequately lighted from above, but occasionally the addition of footlights and sidelights makes an important contribution to the effect obtained. These are of particular value in reducing shadows where models are displayed, especially in the case of shallow windows. This method is shown under "Installation."

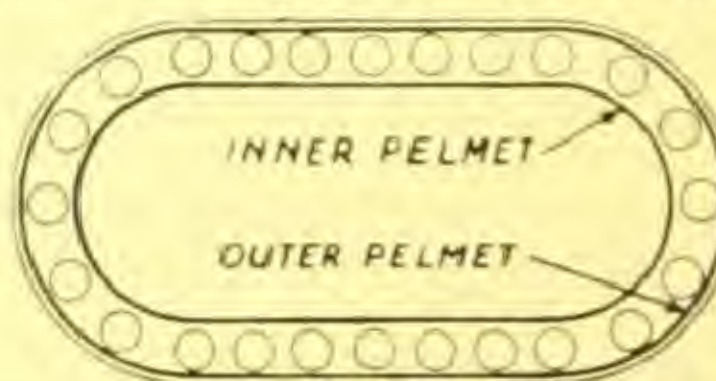
Illustration shows a method, particularly valuable when the window has a return, as it provides a ready means of concealing the reflectors from view.



The following is a typical window layout for lighting island sites.

**Island Sites**

The lighting of island sites presents special difficulties, since the rear part of the reflectors is conspicuous, and unless precautions are taken, the onlooker experiences glare. These objections can, in a large measure, be overcome by the introduction of a second pelmet behind the reflectors, and of such a depth that the filaments of the lamps are concealed from all sides of the island window.



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## ILLUMINATION ENGINEERING DATA (Continued)

This table indicates modern practice for first-class lighting. The required wattage can be approximately estimated from the table:—

Height of window in feet.	Depth of window in feet.	I. For a lighting intensity of approx. 80 foot-candles.	II. On special occasions (lighting intensity approx. 150 foot-candles) switch on extra lights, as indicated below.
3	1½ 3 5	3 SA 150-40 watts 2 SA 150-60 watts 1 SB 225-100 watts 3 SB 225-100 watts	2 SA 150-60 watts 2 SB 225-100 watts 2 SB 225-150 watts
5	1½ 3 5 6½	3 SA 150-60 watts 3 SA 175-75 watts 2 SA 175-75 watts 1 SB 225-150 watts 3 SB 225-150 watts	2 SA 175-75 watts 2 SA 175-75 watts 2 SB 225-150 watts 2 SB 245-200 watts
6½	8 5 6½ 8	3 SA 220-100 watts 3 SA 220-150 watts 2 SA 220-150 watts 1 SB 225-150 watts 3 SB 225-150 watts	2 SA 220-100 watts 2 SA 220-150 watts 2 SB 225-150 watts 2 SA 220-150 watts
8	3 5 6½ 8 10	3 SA 220-100 watts 3 SA 220-150 watts 2 SA 225-150 watts 1 SB 225-150 watts 2 SA 220-150 watts 1 SB 245-200 watts 3 SB 245-200 watts	2 SA 220-150 watts 2 SA 220-150 watts 2 SB 225-150 watts 2 SA 245-200 watts
10	5 6½ 8 10 11½	3 SA 220-150 watts 3 SA 220-150 watts 3 SA 245-200 watts 2 SA 245-200 watts 1 SB 245-200 watts 3 SB 245-200 watts	2 SA 220-150 watts 2 SA 245-200 watts 2 SB 245-200 watts 2 SB 245-200 watts 2 SA 245-200 watts

## Industrial Lighting

(See also Flood Lighting).

## Factory Lighting.

Lighting installations in factories can be, roughly, divided into three classes:—

1. General Overhead Lighting.
2. Localized Lighting.
3. Combination of Overhead and Local Lighting.

## General Overhead Lighting.

The general overhead system of lighting is usually designed so that units are a minimum of 10 feet from the floor, and are so spaced that the illumination is substantially uniform. Work can then be carried out with equal facility in any part of the workshop; moreover, an alteration in the workshop layout does not require a corresponding alteration of the lighting system.

The overhead units used are listed under "Equipment," and comprise the Philllux and Philuma series of reflectors.

## Localized Lighting.

This system is similar in principal to General Lighting, except, of course, being mounted with respect to the work done, there cannot be the same measure of uniformity. Such a method has little to recommend it, as the resultant evils more than outweigh its advantages.

## Combination of Overhead and Local Lighting.

This form of application is used in two ways. Firstly, in those shops where directional illumination is necessary to obtain a proper view of the work, and, secondly, where very high intensities are required for fine operations. In both those cases, the best results are obtainable when a general system of lighting is installed and supplemented by local lighting obtained from properly designed equipment. It is essential that the greatest care be taken to ensure that the variation in intensity provided throughout the rooms by the two systems is insufficient to produce a subtle form of glare by virtue of too great a contrast in brightness. Architects and



engineers are reminded that special papers dealing with this subject are available on application to the Philips Lighting Service Bureau, Box No. 2703C, G.P.O., Sydney.

## Bill Board Lighting.

Like floodlighting, the question of effective and economical Bill Board Lighting requires a nice calculation, which is purely the province of the illumination engineer. Probably there is no form of outdoor lighting in which so much error is evident, and so much unnecessary loss



in consequence. Architects and engineers are again reminded that the Philips Illumination Engineer will be pleased to act in the capacity of consultant for all lighting problems, and all members of the profession are invited to avail themselves of this service.

Further reference to outdoor lighting is made under the heading of Floodlighting.

(Continued on next page)





## ILLUMINATION ENGINEERING DATA (Continued)

## Floodlighting

## Decorative and Industrial.

Floodlighting has been rightly described as the "Glory of the Illumination Engineer," for in this departure from usual practice, some of the most spectacular and fascinating effects are obtained. Floodlighting is extensively used on the Continent and in America, but is still in its infancy as far as Australia is concerned. Recently there have been a few outstanding installations, particularly the lighting of the Royal Netherlands Squadron on the occasion of their visit to Sydney, and the subsequent lighting of the already famous Sydney Harbour Bridge, etc. Without entering too much into intricate technicality, we list here a series of units specially priced to popularize this method of lighting, some photographs, and a list of suggested applications.



The "Philiflood" series of reflectors have been specially designed for the floodlighting of facades, towers, etc. They are, however, also successfully employed for other purposes, such as the lighting of aerodromes, sports-grounds, and other open spaces; for local lighting at loading and discharging berths; for the lighting of large hoardings; for semi-indirect lighting of sheds, etc. The "Philiflood" units are supplied in two fundamentally different types, viz.: Broad beam units (angle of radiation about 120 deg.), white enamelled, types FLA, FLB, FLF; and narrow beam units (angle of radiation about 30 deg.), with parabolic mirror, types FLC, FLD, and FLG.

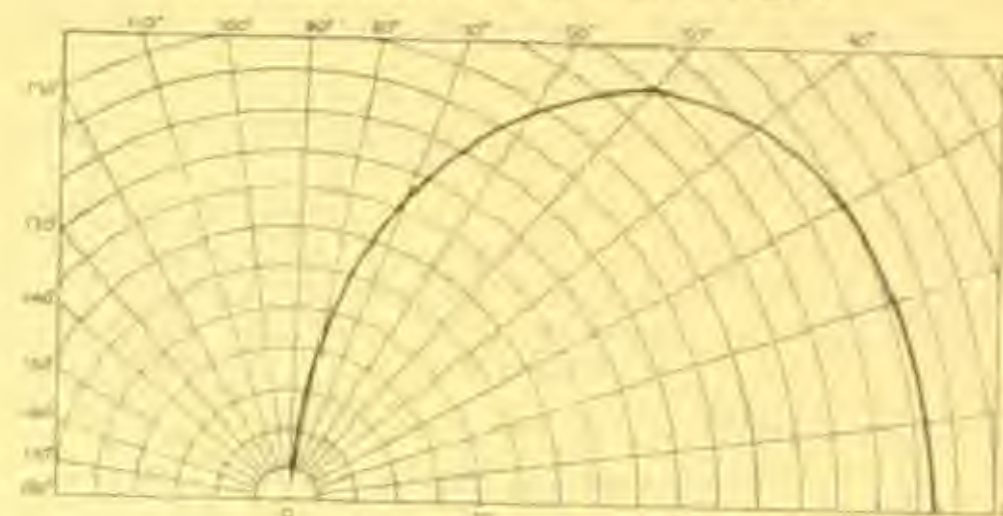
## Wide-Beam Reflectors

"Philiflood" FLA with white-enamelled reflector is suitable for normal lamps of 750 to 1,500 watts inclusive. It may also be used with projector lamps (burning in vertical position, without mirror) instead of with normal lamps, the lighting effect then being 10 per cent. greater. In view of the fact that this reflector gives a broad radiation of light (in an angle of about 120 deg.), it should be placed fairly close to the facades of the building. Type FLA serves for illuminating facades of large area. The reflector is fitted with a binding-clip, by means of which it can be mounted on a rod or tube and conveniently turned into any desired position.



Types FLA and FLF.

PHILIFLOOD FLA and FLF.



1000 Lumens.

"Philiflood" FLA and FLF.

Type	Diameter in inches.	Height in inches.	Normal Gasfilled Lamps	Projection Lamps, Vertical
FLA	18	23½	750, 1000 1500 watt	750, 1000 1500 watt
FLF	12	16	200-300	—

"Philiflood" FLB, with white-enamelled reflector, is a special type for floodlight lamps of 1000 watts (burning in suspensory position). It was therefore possible to give this reflector a highly compact, rectangular form.

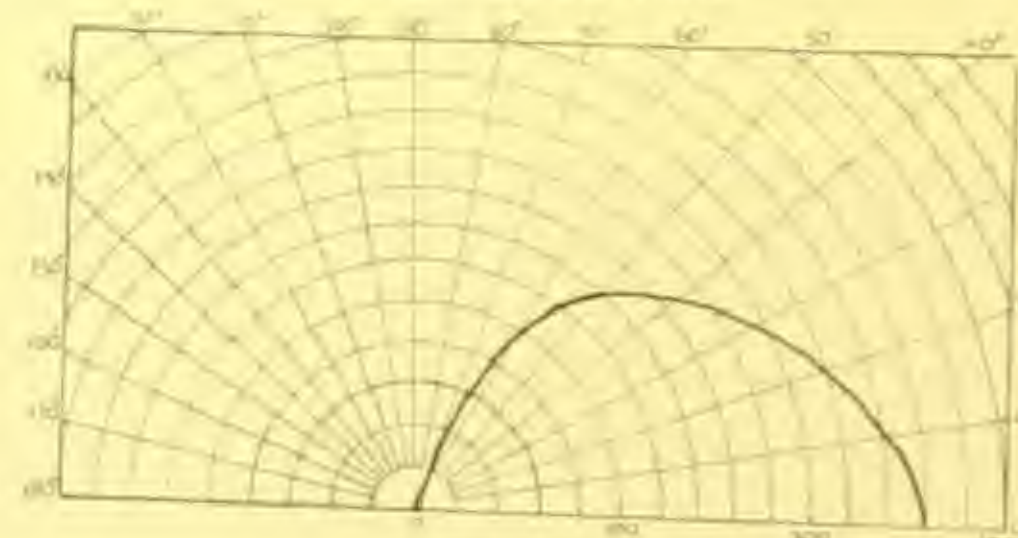


Type FLB.

(maximum inclination from vertical 15 deg.). The radiation can be directed higher or lower by adjusting the height of the lamp at a higher or lower position.

The normal facade-lighting reflectors FLA, when mounted in front of imposing edifices, are liable to mar the appearance of the locality during the daytime. This is never so with the "Philiflood" FLB, the size and shape of which are by no means conspicuous. This reflector may even be mounted on a lamp-post or span-pole. Moreover, it is possible to fit this reflector with a side screen, which sharply limits the sideways radiation. This is a very important consideration when the reflector is mounted at a corner. It should always stand in a practically vertical position

PHILIFLOOD FLB.



1000 Lumens.

"Philiflood" FLB.

Type	Width in inches.	Height in inches.	Special Floodlight Lamps, Vertical
FLB	10	16	1000 watt

"Philiflood" FLF is a smaller type of the FLA. It is provided either with Edison (or bayonet) holder, or with Goliath holder, and is suitable for lamps of 200 and 300



## ILLUMINATION ENGINEERING DATA (Continued)

watts. In order that the filament of the lamp may in both cases be adjusted at the correct light-centre height in the reflector, the metal plate bearing the holders is so constructed that it can be reversed (back turned frontwards). When the Gollath holder is at the front, it is in any case adjusted at a lower position than the Edison or bayonet holder when the latter are turned frontwards.

## Narrow-Beam Reflectors

"Philiflood" FLC, with silvered mirror, in two types—

- (1) With faceted mirror (FLC 1)
- (2) With smooth mirror (FLC 2)

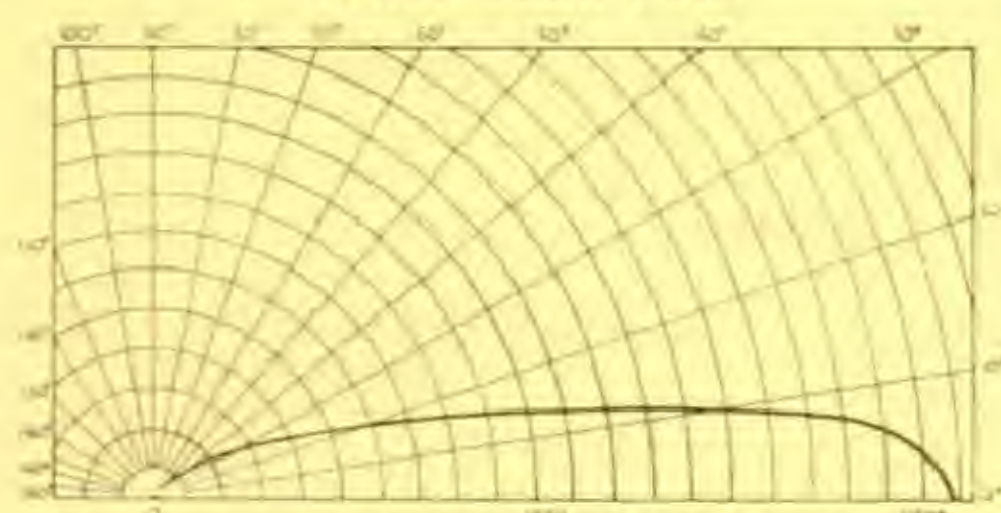
"Philiflood" FLC 1, with faceted mirror, is suitable for normal gas-filled lamps of 300 and 500 watts, and for projector lamps of 1,000 watts. The reflector gives a fairly narrow beam with a very uniform light-distribution. It is, therefore, particularly well suited for illuminating facade surfaces, etc., from a considerable distance (e.g., 40-60 yards).

"Philiflood" FLC 2, with smooth mirror, is suitable for projector lamps of 1,000 watts and gives a narrow, highly-concentrated beam. This type is, therefore, the most suitable for illuminating the tops of towers, spires, gables of houses (reflector to be placed at a distance of 60-200 yards), factory chimneys (reflector to be placed close to base).



Type FLC.

PHILIFLOOD FLC.



1000 Lumens.

"Philiflood" FLC 1 and FLC 2.

Type	Diameter in inches.	Height in inches.	Normal Gasfilled Lamps	Floodlight Lamps
FLC 1	18	18 4/5	300 to 750w.	500 to 1000w
FLC 2	18	18 4/5		500 to 1000w



Type FLD.

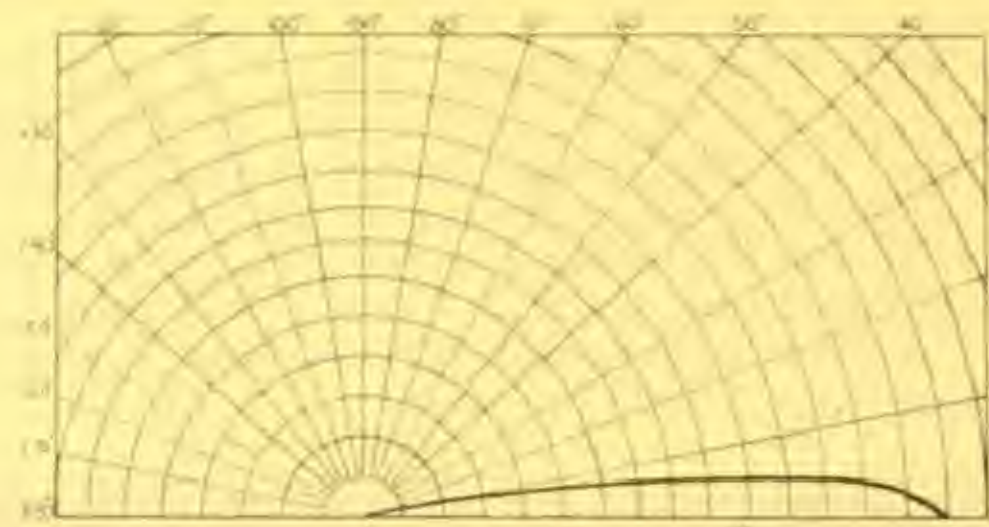
"Philiflood" FLD is a smaller type of the FLC. It is suitable for normal gas-filled lamps of 100 and 200 watts and for projector lamps of 250 watts. In its effect, this model corresponds to the FLC.

Besides for facade lighting, the FLD can also be used for the lighting of small theatre-stages, and especially for the lighting of tennis-courts.

The FLD, like the FLC, is made in two types:—

- (1) Type FLD, with faceted mirror, i.e., with greater light-dispersion.
- (2) Type FLD 2, with smooth mirror, i.e., with projector beam.

PHILIFLOOD FLD.



1000 Lumens.

"Philiflood" FLD 1 and FLD 2.

Type	Diameter in inches.	Height in inches.	Normal Gasfilled Lamps	Floodlight Lamps
FLD 1	13 3/5	14 4/5	100 to 200w	250 watt
FLD 2	13 3/5	14 4/5		250 watt

"Philiflood" FLG, with cylindrical parabolic mirror, is intended for "Linea" lamps. In the longitudinal direction this reflector thus gives a broad radiation of light. On the other hand, in the lateral direction (the line-shaped filament then acting as a luminous point), an ideal, narrow beam is produced, the breadth of which can be controlled by adjusting the lamp.

## Manner of Mounting Types

FLA, FLB and FLF.

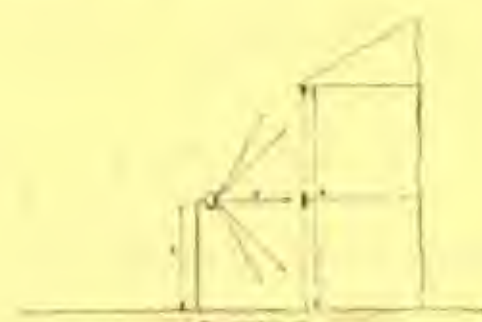


Fig. 1.

The reflector must, if possible, be placed directly in front of the facade. The distance "g" between reflector and facade should be equal to half the height of the facade. The most favourable effect is obtained when the light-centre, height "h," is also equal to half the height of the facade (see Fig. 1). If, for any reason, the reflector has to be placed nearer to the facade, and at a smaller height ("g" and "h" then being less than half the height of the facade), as in Fig. 2, the reflector should, in the case of the FLA and FLF, be tilted backwards to such an extent that the radiation axis is directed towards the middle of the facade. In the case of the FLB, the lamp should be adjusted as low as possible.

## Lamp-Wattage and Number of Reflectors.



Fig. 2.

The distance between the various reflectors should in no case exceed half the height of the facade; in other words, the measurement "b" in Fig. 3 should not be more than half "h."

The wattage required for sufficiently lighting up a facade in a dark environment is about 15 watts per square yard of facade surface.

In a bright environment, about 30 watts per square yard should be applied. This will also be the case when particularly imposing light effects are desired.

(Continued on next page)



## ILLUMINATION ENGINEERING DATA (Continued)



Fig. 3.

half height of facade, 7 yards. Use five reflectors, each with a 1500-watt lamp, mounted at intervals of seven yards.

## For Types FLC, FLD and FLG.

The reflectors FLC 1, FLG 1 (with faceted mirror) and FLG give a fairly broad beam, so that these types can be used for the floodlighting of facades for a considerable distance. In a dark environment, 15 watts per square yard should be applied; in a bright environment (or when a particularly strong illumination is required), 30 watts per square yard.



The reflectors, FLC 2, FLD 2 (with smooth mirror) and FLG, with the filament exactly at the focus, give

## Example:

Length of facade, 36 yards; height, 42 feet (i.e., 14 yards); dark environment. Area of facade, 36 x 14, equal to 504 square yards; required wattage, 504 x 15, equal to 7560 watts;

a very narrow beam. According to the distance between reflector and object (60-200 yards), apply 15 to 45 watts per square yard.

For the FLD reflector we supply a special pedestal, on which the reflector can very easily be mounted without any special fixing devices.

## Colour Philiflooding.

For the production of coloured light we supply small tins of paint. This paint can be poured on to the glass guard and evenly distributed by shaking the glass.

We can supply four different colours: Red, green, yellow and blue. The paint can be washed off again by means of cleaning liquid which we supply together with the paint.

## Night Sports.

Plans and specifications for the lighting of all outdoor sports, such as tennis, bowls, football, etc., are



available on application to Philips Lamps. All that is necessary is to give purpose and dimension of the area to be lighted.

## General Lighting.

Public buildings.

Schools.

Churches.

Hospitals.

Under "Equipment" we illustrate a series of the Phililite Units available for general purpose, but, as in many cases special consideration is necessary, we again invite you to avail yourselves of the special advisory service of our Consultant. This service offers the best available advice in all technical problems arising in lighting practice, and is designed for the practical help of the profession.

EQUIPMENT  
INCANDESCENT ELECTRIC LAMPSGAS-FILLED LAMPS  
ARLITA PEARL INSIDE  
FROSTED.

Volts.	Cap.	Watts.
20-260	B.C. or E.S.	40 60 75 100

## CLEAR AND ARGENTA.

Volts.	Cap.	Watts.
20-95	B.C. or E.S.	15
20-165		25
20-260		40
		60
		75
	Gol.	100
		150
20-260		200
25-260		300
35-260		500
50-260		750*
75-260		1000*
100-260		1500*
100-260		2000*
100-260		3000*

\*Not supplied with Argenta Glass.

## DAYLIGHT BLUE GLASS.

Volts.	Cap.	Watts.
20-260	B.C. or E.S.	40 60 75 100 150 200
20-260	Gol.	300
25-260		500
35-260		750
50-260		1000
75-260		1500

## VACUUM LAMPS

## ARLITA PEARL INSIDE FROSTED.

Volts.	Cap.	Watts.
20-260	B.C. or E.S.	15 25 40

## ESPIRAL, CLEAR, DROP SHAPE.

Volts.	Cap.	Watts.
20-260	B.C. or E.S.	15 25 40

STANDARD TYPE, CLEAR,  
PEARSHAPE.

Volts.	Cap.	Watts.
20-260	B.C. or E.S.	15 25 40 60

REINFORCED CONSTRUCTION,  
CLEAR PEARSHAPE (WITH  
ADDITIONAL FILAMENT SUP-  
PORTS).

Volts.	Cap.	Watts.
20-260	B.C. or E.S.	25 40 60

SIGN LAMPS, PEARSHAPE.  
Daylight, Natural Colour, Colour  
Sprayed.

Volts.	Cap.	Watts.
11	E.S.	5
60		5
120		10
200-260		15



ILLUMINATION LAMPS,  
DROPSHAPE.

Clear, Sprayed, Natural Coloured.

Volts.	Cap.	Watts.
20-260	B.C. or E.S.	15

CARBON FILAMENT LAMPS,  
PEARSHAPE.

Volts.	Cap.	Candle-Power.
20-260	B.C. or E.S.	8
		16
		25
		32
		50

With voltage ranges mentioned in this catalogue between 20V.-260V., the following voltages are meant:—

1. Between 20 and 74V., every one volt.
2. Between 75 and 260V., in five-volt steps.

VACUUM SPRAYED COLOUR AND  
NATURAL COLOURED, PEAR-  
SHAPE, OR ESPIRAL DROP-  
SHAPE.

Volts.	Cap.	Watts.
20-260	B.C. or E.S.	15
		25
		40
		60

GAS-FILLED SPRAYED COLOUR  
AND NATURAL COLOURED  
GLASS.

Volts.	Cap.	Watts.
20-260	B.C. or E.S.	40
		60
		75
		100
		150
		200
	Gol.	300

## STOCK COLOURS:

Natural Coloured: Red, Blue, Green, Yellow (Amber).  
Sprayed: Red, Blue, Green, Orange, Yellow.

## CANDLE LAMPS (VACUUM).

For Chandeliers, Wall Brackets,  
Candle Fittings, etc.

Clear, Frosted, Colour Sprayed.

Volts.	Cap.	Description.	Watts.
20-260	B.C. or	Plain flame	15
20-260	S.B.C.	Plain flame	25
		Twisted flame	25
20-260	E.S. or	Theatre pattern	
	S.E.S.		
20-260		Twisted	25
20-260		Do. do.	40

CANDELABRUM LAMPS  
(VACUUM).

Fitted with Candle Tube, ready for  
use with Candle Fittings.

Volts.	Cap.	Watts.
100-260	S.B.C. or S.E.S.	15 25

## EQUIPMENT (Continued)

ROUND BULB CLEAR OR  
FROSTED LAMPS (VACUUM).  
For use with American Candle  
Fittings.

Volts.	Cap.	Watts.
20-260	E.S. and	15
	S.B.C. or	25
	B.C.	40

SHOW WINDOW LAMPS  
(VACUUM).

Clear and Half Silvered.

Volts.	Watts.	Diam.	Overall of tube.	Diam. of Cap.
100-260	25	1½	10½	¾in.
	40	1½		¾in.
	60	1½	12¾	¾in.
	100	1½		¾in.

There are special holders for these Show Window Lamps. Clear Window Lamps are to be used with Reflectors. Half-silvered Lamps do not require any additional Reflectors.

RADIATOR LAMPS (FLAME  
SPRAYED).

Volts.	Cap.	Watts.
100-260	B.C.	250

## PILOT LAMPS (VACUUM).

For Indicating Purposes.

Description.	Volts.	Cap.	Watts.
Clear			15
Red Sprayed	20-260	S.B.C.,	
or Varnished		B.C.	15
		or E.S.	

See also Neon Pilot Indicator Lamps.

PROJECTION LAMPS, CLEAR  
SILVERED.

Volts.	Watts.	Cap.	Horizontal.	Vertical with Mirror.
100-160 and 200-260	100	E.S.	107	106
	250	E.S.	432	433
	500	Gol.	66	60
	1000	Gol.	68	62
	1500	Gol.	69	63
	*2000	Gol.	309	310
	*3000	Gol.	345	346

\*Not supplied with Silvered Mirror.

## CINEMA LAMPS.

Volts.	Watts.	Cap.	Type No.
100-130	100	E.S.	348
	250	E.S.	383
and	500	E.S.	375
200-240	1000	Gol.	297
	100	E.S.	410
	300	E.S.	376
30	900	Gol.	75
	900	Gol.	379E
	600	Gol.	381
	750	Gol.	382
15	750	Gol.	6001
	750	Gol.	6004

Note.—Type No. 6004 is supplied with inside mirror at an extra of 10 per cent. on above list price.

Note.—Type Nos. 6001 and 6004 are both constructed to burn cap upwards.

TUBULAR LAMPS (VACUUM).  
For use where space is limited, these  
are sometimes essential.  
Clear, Frosted.

Volts.	Cap.	Watts.
20-260	Bayonet or screw	15 25

## FLOODLIGHT LAMPS.

Volts.	Watts.	Cap.	Type No.
100-160 and 200-260	100	E.S.	120
	250	E.S.	123
	500	Gol.	125
	1000	Gol.	504
	1500	Gol.	—

## DECORATIVE SETS.

(200-250 Volt Series Burning).

Sets comprise 16 miniature electric olive-shape coloured lamps (assorted: Red, blue, green, orange and white); two spare lamps, and the necessary flexible electric wiring, with 16 lamp-holders for attachment anywhere.

Special Round Bulb Lamps can be supplied in place of olive-shaped lamps.

## FLASOLITE LAMPS.

In Red, White, Blue, Orange, Yellow, Flame, Green, in addition to Clear.

Volts.	Cap.	Watts.
200-260	B.C. or E.S.	40 or 60

## THE DUO-SAVELITE.

With two lighting intensities—4 or 25 watts. Opal glass.

## PHOTOGRAPHIC LAMPS.

## THE DUO-PHOTO LAMP.

Available in two types—Clear White and Yellow (for printing and developing) and Clear White and Red (for developing plates and films). 100-260 volts.

## THE PHOTOMIRENTA.

For the lighting of the most modern studios. Opal glass, with half inside mirror. 200-260 volts, 500 watts.

## THE ARGA PHOTO.

Designed for spot lighting in studios. Should be used with a Philiray Flood Reflector, Type SC255. 200-260 volts, 500 watts.

## DARKROOM LAMPS.

Spiralized Metal Filament, Ruby Glass, Vacuum Type, 100-260 volts. Pearshape BC or ES. 25W., 40W. and 60W.

## NEON INDICATOR LAMPS.

## Dwarf Indicators.

Voltage.	Current.	Cap.
110-160		Small B.C.
200-260	D.C. or A.C.	Small E.S.
200-260		or Candelabra

## Standard Indicators.

Voltage.	Current.	Cap.
110-160		
200-260	D.C. or A.C.	B.C. or E.S.
200-260		

(Continued on next page)



## EQUIPMENT (Continued)—LUMINAIRES, REFLECTORS, ETC.

## PHILILITE LUMINAIRES

Type.	For Gasfilled Lamps of:	Globe Diam. Inches.	Total Length. Inches.
DA 26	40, 60, 75, 100 watts	10 $\frac{1}{4}$	35 $\frac{1}{2}$
DA 33	100, 150, 200 watts	13	38 $\frac{3}{16}$
DA 35	300, 500 watts	13 $\frac{1}{2}$	39 $\frac{1}{2}$
DB 26	40, 60, 75, 100 watts	10 $\frac{1}{4}$	31 $\frac{1}{2}$
DB 33	100, 150, 200 watts	13	34 $\frac{1}{16}$
DC 26	40, 60, 75, 100 watts	10 $\frac{1}{4}$	33 $\frac{1}{2}$
DC 33	100, 150, 200 watts	13	35 $\frac{1}{16}$
DC 35	300, 500 watts	13 $\frac{1}{2}$	38 $\frac{1}{2}$
DD 26	40, 60, 75, 100 watts	10 $\frac{1}{4}$	32 $\frac{1}{2}$
DD 33	100, 150, 200 watts	13	34 $\frac{1}{2}$
DD 35	300, 500 watts	13 $\frac{1}{2}$	36 $\frac{1}{2}$
DF 26	40, 60, 75, 100 watts	10 $\frac{1}{4}$	35 $\frac{1}{16}$
DF 33	100, 150, 200 watts	13	39
DF 35	300, 500 watts	13 $\frac{1}{2}$	40 $\frac{9}{16}$
DH 20	40, 60, 75, 100 watts	7 $\frac{1}{2}$	33 $\frac{1}{16}$
DH 25	100, 150, 200 watts	9 $\frac{1}{2}$	36 $\frac{1}{16}$
DH 33	300, 500 watts	13	40 $\frac{1}{2}$
DJ 25	40, 60, 75, 100 watts	9 $\frac{1}{2}$	31 $\frac{1}{2}$
DJ 30	100, 150, 200 watts	11 $\frac{1}{16}$	32 $\frac{1}{2}$
DJ 35	300, 500 watts	13 $\frac{1}{4}$	35 $\frac{1}{16}$
DM 26	40, 60, 75, 100 watts	10 $\frac{1}{4}$	28 $\frac{1}{4}$
DM 33	100, 150, 200 watts	13	31 $\frac{1}{2}$
DM 35	300, 500 watts	13 $\frac{1}{2}$	33 $\frac{1}{2}$
DN 25	100, 150, 200 watts	9 $\frac{1}{2}$	31 $\frac{1}{2}$
DN 35	300, 500 watts	13 $\frac{1}{2}$	34 $\frac{1}{2}$
DE 30	40, 60, 75, 100 watts	11 $\frac{1}{16}$	8 $\frac{1}{16}$

Type.	For "Argenta" Lamps of:	Diam. Inches.	Height. Inches.
PA 16	40, 60, 75, 100 watts	6 $\frac{3}{16}$	3 $\frac{1}{2}$
500	40 and 60 watts	1 $\frac{1}{2}$	4 $\frac{1}{2}$
510	75 and 100 watts	1 $\frac{3}{4}$	5 $\frac{1}{2}$

## PHILILUX LUMINAIRES

Type.	For Gasfilled Lamps of:	Globe Diam. Inches.	Total Length. Inches.
GAI 26	40, 60, 75, 100 watts	10 $\frac{1}{4}$	35 $\frac{1}{2}$
GAI 33	100, 150, 200 watts	13	38 $\frac{3}{16}$
GAI 35	300, 500 watts	13 $\frac{1}{2}$	39 $\frac{1}{2}$
GAD 26	40, 60, 75, 100 watts	10 $\frac{1}{4}$	35 $\frac{1}{2}$
GAD 33	100, 150, 200 watts	13	38 $\frac{3}{16}$
GAD 35	300, 500 watts	13 $\frac{1}{2}$	39 $\frac{1}{2}$
GBD 26	40, 60, 75, 100 watts	10 $\frac{1}{4}$	32 $\frac{1}{2}$
GBD 33	100, 150, 200 watts	13	34 $\frac{1}{2}$
GBD 40	300, 500 watts	15 $\frac{1}{2}$	41
GAH 26	40, 60, 75, 100 watts	10 $\frac{1}{4}$	35 $\frac{1}{2}$
GAH 33	100, 150, 200 watts	13	38 $\frac{3}{16}$
GAH 35	300, 500 watts	13 $\frac{1}{2}$	39 $\frac{1}{2}$
GJH 25	100, 150, 200 watts	9 $\frac{1}{2}$	31 $\frac{1}{2}$
GJH 35	300, 500 watts	13 $\frac{1}{2}$	35 $\frac{1}{16}$

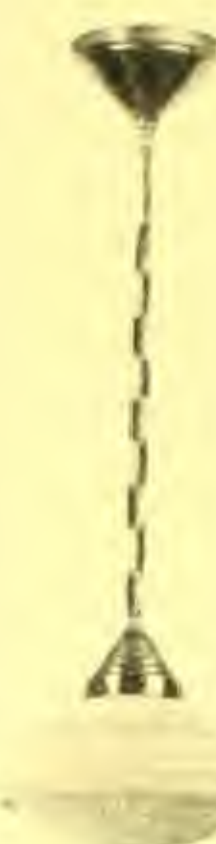
## PHILIRAY REFLECTORS

Type.	For Gasfilled lamps of:	Holder.	Diam. in Inches.
SA 150	40, 60 watts	HA 58	5 $\frac{1}{2}$
SA 175	60, 75 watts	HA 58	6 $\frac{1}{2}$
SA 220	100, 150 watts	HB 78, HC 78	8 $\frac{1}{2}$
SA 245	150, 200 watts	HB 78, HC 78	9 $\frac{1}{2}$
SB 225	100, 150 watts	HB 78, HC 78	8 $\frac{1}{2}$
SB 245	150, 200 watts	HB 78, HC 78	9 $\frac{1}{2}$
SC 220	100, 150 watts	HB 78, HC 78	8 $\frac{1}{2}$
SC 255	150, 200 watts	HB 78, HC 78	10 $\frac{1}{16}$

Type.	For Spiralized filament lamps of:	Holder.	Diam. in Inches.
SD 80	15, 25 watts	HD 30	3 $\frac{1}{2}$



Phililite Type DA.



Phililite Type DB.



Phililite Type DE.



Phililite Type DF.

## PHILIRAY HOLDERS

Type.	For Reflectors.	Total Height with Reflector in Inches.
HA 58	SA 150	7 $\frac{1}{16}$
	SA 175	8 $\frac{1}{16}$
HB 78	SA 220-SA 245	9 $\frac{1}{16}$ -10 $\frac{1}{4}$
	SB 225-SB 245	11 $\frac{1}{16}$ -12 $\frac{1}{8}$
HC 78	SC 220-SC 255	9 $\frac{1}{8}$ -11 $\frac{1}{16}$
	SA 200-SA 245	11 $\frac{1}{16}$ -13
	SB 225-SB 245	13 $\frac{1}{8}$ -15 $\frac{1}{8}$
	SC 220-SC 255	12-14 $\frac{3}{16}$
HD 30	SD 80	2 $\frac{1}{16}$ -3 $\frac{1}{16}$

The holder HA 58 is not adjustable.

The holders HB 78 and HD 30 can be adjusted for different heights.

The holder HC 78 can be adjusted for different heights and turned in all directions.

## PHILIRAY COLOUR SCREENS

Part.	For Reflectors.
Colour-screen Holder K 180	SA 150, SA 175
Set of Colour-screens G 180 (Red, yellow, green, blue, violet)	
Colour-screen Holder K 260	SA 220, SA 245
Set of Colour-screens G 260 (Red, yellow, green, blue, violet)	SB 225, SB 245
	SC 220, SC 255

## PHILIFLOOD FLOODLIGHTS

Type.	Lamps.	Diam. in Inches.	Height in Inches.
FLA	For normal gas-filled lamps of 500, 750, 1000, 1500 watts For projection lamps of 500, 1000, 1500 watts	17 $\frac{1}{4}$	22 $\frac{3}{16}$

Type	Special Lamp for Burning in Suspensory Position.	Breadth in Inches.	Height in Inches.
FLB	1000 watts	11	15 $\frac{1}{2}$

Type.	For Gasfilled lamps of:	Diam. in Inches.	Height in Inches.
FLF	200, 300 watts	11 $\frac{1}{16}$	15 $\frac{1}{16}$

Type	Mirror	Lamp Projector	Normal Gasfilled Lamp	Diam. in Inches.	Length in Inches.
FLC 1	Facetted	1,000 watts	300, 500 watts	17 $\frac{1}{4}$	20 $\frac{1}{4}$
FLC 2	Smooth	1,000 watts	—	17 $\frac{1}{4}$	20 $\frac{1}{4}$
FLD 1	Facetted	250 watts	100, 200 watts	12	16 $\frac{1}{2}$
FLD 2	Smooth	250 watts	—	12	16 $\frac{1}{2}$

Type.	For "Linea" Lamps of:	Breadth in Inches.	Height in Inches.
FLG	300, 500, 1000 watts	8 $\frac{1}{16}$	14 $\frac{3}{16}$



## EQUIPMENT (Continued)—LUMINAIRES, REFLECTORS, ETC.

## PHILUMA REFLECTORS

Type.	For Gasfilled Lamps of:	Diam. of Reflector in inches	Total Height in inches
NR 25	40 and 60 watts	9 $\frac{1}{2}$	6 $\frac{1}{2}$
NR 30	75 and 100 watts	11 $\frac{1}{4}$	7 $\frac{1}{8}$
NR 35	150 watts	13 $\frac{1}{2}$	8 $\frac{1}{2}$
NR 40	200 watts	15 $\frac{1}{2}$	9
NR 45	300 and 500 watts	17 $\frac{1}{2}$	12 $\frac{1}{8}$
NR 30D	75 and 100 watts	11 $\frac{1}{4}$	7 $\frac{1}{2}$
NR 35D	150 watts	13 $\frac{1}{2}$	8 $\frac{1}{4}$
NR 40D	200 watts	15 $\frac{1}{2}$	9 $\frac{1}{2}$
NB 35	100, 150, 200 watts	13 $\frac{1}{2}$	12 $\frac{1}{2}$
NB 45	300, 500, 750 watts	17 $\frac{1}{2}$	16 $\frac{1}{2}$
ND 30	100, 150, 200 watts	11 $\frac{1}{4}$	15 $\frac{1}{2}$
ND 40	300, 500, 750, 1000 watts	15 $\frac{1}{2}$	19 $\frac{1}{2}$
NG 25	100, 150, 200 watts	9 $\frac{1}{2}$	11 $\frac{1}{2}$
NG 35	300, 500, 750, 1000 watts	13 $\frac{1}{2}$	16 $\frac{1}{2}$
NG 45	1000, 1500, 2000 3000 watts	17 $\frac{1}{2}$	24 $\frac{3}{8}$

Type.	For "Argenta" Lamps of:	Diam. of Reflector in inches	Total Height in inches
NF 30	40, 60, 75, 100 watts	11 $\frac{1}{4}$	12 $\frac{1}{2}$

## PHILUMA JR.

Type.	Designed With:	For Gasfilled Lamps of:	Diam. of Reflector in inches
KRA I	Gas Bush $\frac{1}{2}$ in.	40, 60 75 watts	6 $\frac{1}{4}$
KRA II	Ring Nipple $\frac{1}{2}$ in.		
KRA III	Suspension Clip $\frac{1}{2}$ in.		
KRA IV	Porcelain Holder		
KRA V	Porcelain Holder, with Switch		
KRA VI	1 $\frac{1}{2}$ in. Aperture		
KRB I	Gas Bush $\frac{1}{2}$ in.	40, 60 75 watts	6
KRB II	Ring Nipple $\frac{1}{2}$ in.		
KRB III	Suspension Clip $\frac{1}{2}$ in.		
KRB VI	1 $\frac{1}{2}$ in. Aperture		
KRC I	Gas Bush $\frac{1}{2}$ in.	100, 150 200 watts	9 $\frac{1}{2}$ 12 $\frac{1}{8}$
KRC II	Ring Nipple $\frac{1}{2}$ in.		
KRC III	Suspension Clip $\frac{1}{2}$ in.		
KRC VI	1 $\frac{1}{2}$ in. Aperture		



Phililite Type DC.



Phililite Type DH 16.



Phililite Type 500.



Phililite Type SC.

## PHILUMA JR. (Continued)

Type.	Designed With:	For Gasfilled Lamps of:	Diam. of Reflector in inches
KRD IV	Porcelain Holder	40, 60 75 watts	6 $\frac{1}{4}$
KRD V	Porcelain Holder and Switch		
KRD VI	1 $\frac{1}{2}$ in. Aperture		

## PHILULUX REFLECTORS

Type.	For Gasfilled Lamps of:	Diam. of Reflector in inches	Total Height in inches
ND 30	100, 150, 200 watts	11 $\frac{1}{4}$	15 $\frac{1}{2}$
ND 40	300, 500, 750, 1000 watts	15 $\frac{1}{2}$	19 $\frac{1}{2}$
NG 25	100, 150, 200 watts	9 $\frac{1}{2}$	11 $\frac{1}{2}$
NG 35	300, 500, 750, 1000 watts	13 $\frac{1}{2}$	16 $\frac{1}{2}$
NG 45	1000, 1500, 2000, 3000 watts	17 $\frac{1}{2}$	24 $\frac{3}{8}$
NB 35	100, 150, 200 watts	13 $\frac{1}{2}$	12 $\frac{3}{8}$
NB 45	300, 500, 750, 1000 watts	17 $\frac{1}{2}$	16 $\frac{1}{2}$
NA 30	100, 150, 200 watts	12	11 $\frac{1}{8}$
NA 35	300, 500, 750, 1000 watts	13 $\frac{1}{2}$	15 $\frac{9}{16}$
NA 45	750, 1000, 1500 watts	17 $\frac{1}{2}$	22 $\frac{1}{8}$
NE 50	200, 300, 2 x 500 watts 2 x 750 watts, or 1 x 500 and 1 x 300 watts, or 1 x 100* and 1 x 750 watts	19 $\frac{1}{4}$	21 $\frac{1}{8}$

\* For this, a Goliath-Edison or Goliath-Swan Reducer can be supplied.

NC 30	100, 150, 200 watts	11 $\frac{1}{4}$	14 $\frac{1}{2}$
NC 40	300, 500, 750, 1000 watts	15 $\frac{1}{2}$	19 $\frac{1}{2}$
NL 30	100, 150, 200 watts	11 $\frac{1}{4}$	13 $\frac{1}{2}$
NL 40	300, 500, 750, 1000 watts	15 $\frac{1}{2}$	18 $\frac{1}{2}$
NF 30	40, 60, 75, 100 watts (Argenta Lamps only)	11 $\frac{1}{4}$	13 $\frac{1}{2}$
NK 30	60, 75, 100, 150, 200 watts	11 $\frac{1}{4}$	11 $\frac{1}{8}$
NM	100, 150, 200 watts	—	10 $\frac{1}{8}$
NU 30	300, 500, 750, 1000 watts	11 $\frac{1}{4}$	22 $\frac{1}{2}$



# STATE ELECTRICITY COMMISSION OF VICTORIA

31f

S.A.A. File No.

HEAD OFFICE: 22 WILLIAM STREET, MELBOURNE

Metropolitan Electricity Supply Showrooms:  
247 FLINDERS LANE, MELBOURNEDISTRICT SHOWROOMS THROUGHOUT  
VICTORIAS  
E  
C  
LIGHTING

[For Other Products, See Pages 376, 430, 440]

## HOME LIGHTING

### Fundamental Principles

Home lighting must be judged from two viewpoints—utility and decoration—and the aim should be to achieve an adequate measure of each.

Unfortunately, most homes are poorly lighted, i.e., they are inadequate as regards sufficiency, shading, control and distribution. The importance of the utilitarian viewpoint cannot be too strongly stressed, for the eyesight of people, especially children, must be carefully guarded. It is essential to attain brightness, but it is equally essential to avoid glare.

From the decorative standpoint, good lighting is a material aid to the effective display of the furnishings. It may be said that a well-lighted room is half furnished, but a half-lighted room is poorly furnished.

### Electrical Convenience

The convenient use of electricity for home lighting is limited most seriously by the inadequacy of the wiring. Lighting and power points should be of such numbers and in such positions as to permit of the artistic arrangement of portable lamps and also to make the normal night-time occupations of reading, sewing and card-playing pleasurable.



Wall Bracket.

Because of the varied types of homes, no fixed rule can be set down as to the number of power points to be provided, but present good practice is to provide at least one duplex power point for every 150 square feet of floor area. This not only permits greater convenience and variety in illumination by

means of portable lamps, but allows for the operation of household electrical appliances without the necessity of plugging them into a lamp socket.

Power points should be placed at a height which will make them readily accessible and will obviate the dragging of cords. A height of eighteen inches above the floor has been found satisfactory for most conditions.

In the bathroom and kitchen, power points should be placed 48 inches above the floor, as they are then more accessible for the appliances used therein.

Although wall brackets are decorative and tend to enliven the living-room, they should not be depended upon as sources of lighting for utilitarian purposes. Such fittings usually give best results when mounted about 72 inches above the floor level.

Utilitarian brackets used for the lighting of mirrors and for the lighting over the sink in the kitchen should be so arranged that the light source is 66 inches above the floor.

Switches and their location should be chosen from the viewpoint of convenience, appearance and service. Generally the most convenient position is at the knob side of the most used doorways and about 48 inches from the floor.

### Good Wall and Ceiling Finishes

Wherever possible, walls and ceilings should be light coloured, but not so bright as to cause glare. A room having a cream ceiling and walls down to the picture rail and the remainder of the walls in deeper cream or buff should give satisfactory results from both the artistic and utilitarian aspects. Dark colours should be avoided as much as possible, as they absorb light.



Bracket Lantern.



## Schedule of Lamp Wattages for Various Rooms

One watt of electricity for every square foot of floor space is considered to be the minimum requirement for good lighting conditions in living-rooms and the like. The amount of light, however, depends greatly upon the function for which the rooms are used.

A simple method of calculating the required illumination or required wattage by the "Lumen" method is given below:—

L = lumens required per outlet (for size of lamp refer to Table No. 1).

A = area to be lighted.

F = foot-candles required.

N = number of outlets.

K = co-efficiency of utilisation; an average figure being 0.35 for medium-coloured walls and ceilings.

Then  $L = \frac{A \times F}{N \times K}$

TABLE No. 1

Approximate Values of Lumen Output—Gas-filled Lamps—  
200-250 volts.

Watts	60	75	100	150	200	300	500	1000
Total lumens	545	750	1100	1720	2510	3930	7110	16,000

The minimum foot-candles required to give satisfactory illumination for various classes of service are as follows:—

Porch	.5
Hall (entrance)	.5—1.0
Lounge	2.0—3.0
Kitchen	2.0—3.0
Bedroom	1.0—2.0



Floor Standard.



Hanging Bowl.



Kitchen Unit.

TABLE No. 2  
ROOM REQUIREMENTS

Room	Type of Centre Fixture	Suggested Wattage of Each Lamp	No. of Wall Brackets	Suggested Wattage of Each Lamp
Living-Room	Semi-indirect or	100-	2 2-lgt. or 4 1-lgt.	25-40
	Indirect bowl or	200		
	3 or 5 light Candelabra fixture	25-40		
Dining-Room	Direct lighting fixture suspended over table	100	2	25-40
Kitchen	Enclosing unit suspended or mounted on ceiling	100-150	1 over sink 1 over stove	40
Bedrooms	Enclosing unit or semi-indirect bowl	100	2 (on either side of dressing-table)	25-40
			1 table lamp or bracket over bed	40
Hall	Small enclosing unit or lantern	25-40		
Bathroom	Enclosing unit mounted on ceiling	60	2 (one on either side of mirror or 1 above mirror)	25-40
Laundry	White shade or enclosing unit	100		
Garage	Enamelled iron shade	100		

## Selection of Lighting Fixtures

In the selection of lighting fixtures it should be borne in mind that they should harmonise with the general furnishings of the room and at the same time distribute the correct amount of light at the required points.

A dining-room requires a centre fixture which will throw the light down upon the table. Wall brackets may be used to enhance the general beauty of the room.

A bedroom requires general lighting from a centre fixture and, in addition, a bracket lamp should be placed at each side of the dressing-table mirror. A plug and switch on the wall for operating a bedside reading-lamp is also an attribute to comfort in this room.

The kitchen requires an even distribution of light and this can be best effected by a centre fixture. The provision of bracket lights over the sink and stove is a desirable feature.

The bathroom is best lighted by a bracket lamp on each side of the mirror. In a large bathroom, however, a centre fixture may also be required.

Entrance halls and stairways require general illumination furnished from centre fixtures. Wall brackets may assist in the lighting of irregular halls and stairways and also add to their beauty.

(Continued on next page)



## OFFICE LIGHTING

## Office Lighting Requirements

There are two essentials for office lighting—(a) *adequate quantity* of light to permit of clear, quick vision, and (b) *good quality* of light to prevent eye strain and eye fatigue.

From basic scientific facts on light and vision and from practical experiments it has been ascertained that a uniform illumination of at least 10 ft. candles is desirable for the usual class of office work.

The quality of illumination should be such that, although the lighting is bright, there are no objectionable shadows cast.

## Lighting Recommendations

To obtain efficient lighting with indirect or semi-indirect lighting units, the ceiling and upper side walls should be kept light in tone—white or light cream—and all glossy finishes should be avoided.

The following table shows the recommended spacing distance between lighting units, etc., for various ceiling heights:—

Ceiling Height (feet)	Spacing distance between Units		Maximum distance from outside units to wall (feet)	Suspension distance from ceiling to top of reflector (feet)
	Usually recommended (feet)	Maximum permissible (feet)		
9	8	9	3½	1½
10	9	10	4	1½
11	10	12	4½	2
12	10-12	13	5	2½
13	10-12	15	6	3
14	10-13	16	6½	3

## Types of Lighting Units

To achieve the highest standard of illumination the office is best illuminated by means of an indirect lighting fixture. Through the medium of this type of fixture the light from the lamps is directed to the ceiling, from whence it is reflected downward on to the working level as a diffused comfortable illumination. In cases where the office ceiling is of a dark colour, it is advisable to use semi-indirect lighting fixtures to accomplish the same final result. In some cases, however, the ceiling may be too dark for even this type of illumination, in which case, direct lighting must be used. If this must be resorted to, the direct lighting fixtures should be placed in such positions that they will obviate as much as possible objectionable shadows which are likely to result.

The number of lighting units obviously depends upon the floor area. In a small office (area less than 400 sq. ft.) with the usual ceiling height of 10 to 12 ft., one lighting unit of the indirect or semi-indirect type for every 70-90 sq. ft. of floor area is recommended, and the area per lighting unit should not exceed 100 sq. ft. In a large office (area more than 400 sq. ft.) with the ceiling height of 10-12 ft., one indirect or semi-indirect lighting unit for every 90 to 110 sq. ft. of floor area is recommended, and the area per lighting unit should not exceed 145 sq. ft.

The following table gives the proper lamp size based upon the foregoing recommendations:—

Size of Office	Floor area per lighting unit	Lamp size
Offices requiring one or two lighting units	Less than 70 sq. ft.	200 watt
	70-125 sq. ft.	300 watt
	125-225 sq. ft.	500 watt
Offices requiring four lighting units	Less than 60 sq. ft.	150 watt
	60-95 sq. ft.	200 watt
	95-165 sq. ft.	300 watt
Offices requiring six or more lighting units	Less than 80 sq. ft.	150 watt
	80-120 sq. ft.	200 watt
	120-190 sq. ft.	300 watt



Semi-Indirect  
"Keldon" Unit



Semi-Indirect  
Prismatic Top



Indirect Unit  
"Luminaire"



Enclosing Globe, with Single  
Chain Suspension.



## SHOP LIGHTING



Floodlight.

The progressive shop-keeper of to-day is fully alive to the fact that light is his most efficient salesman, and serves him well for an astonishingly small salary. The employment of this economic agent to the fullest extent is therefore imperative. The question is not whether he can afford good lighting, but whether he can afford to be without it; for it has been proved conclusively that the public buy where the light is bright.

## Conservation of Light

Apart from glare, the hanging of pendants in a window is extremely wasteful of light—see Fig. (i). Of the total light given by the lamp only one-third illuminates the display, the remainder being wasted in lighting the ceiling or passing out of the window into the street. The proper control of light by modern lighting equipment, as shown in Fig. (ii), adds materially to the effectiveness of a display.

## Arrangement of Reflectors

The essence of good modern window lighting is to light the goods brilliantly while completely screening the lamps and reflector from the view of the public. It is usual to install the reflectors at the top front of the window, and to conceal them by means of a pelmet, usually of cloth, placed between the reflectors and the window. This method of installation is clearly shown in Fig. (iii).

An alternative method of screening the lamps from view is that of recessing the reflectors in a false ceiling, as shown in Fig. (iv). This method is especially desirable when the window has a return, as it provides a ready means of concealing the reflectors from any angle.

Fig. (v) shows yet another method of installation which may be employed when the window is in course of construction, the ceiling being recessed to accommodate the reflectors.

When reconstructing lofty windows, it is customary to install the reflectors level with the transom bar, the pelmet being draped below. Where the frieze consists of decorative glass, some lighting may be provided to make it luminous, or the space in the frieze can be used for display purposes and lighted separately.

## Colour Lighting

Colour lighting makes an irresistible appeal to the public, and thus gives the shop increased advertising power. In some instances, the introduction of colour not only improves the appearance of the display as a whole, but adds to the selling value of individual articles.

Many shopkeepers are installing lighting systems which give the necessary flexibility of colour arrangement to ensure the best results from any display.

Colour can be obtained by using colour sprayed lamps in place of clear ones, or more effectively, by fitting colour frames over the mouths of the reflectors. A wide range of coloured glasses and gelatines is available to produce any desired colour combination.

## Spotlights and Floodlights

In addition to general window lighting, spotlights and floodlights should be installed for giving special emphasis to certain features in the display. Spotlights direct an intense beam on a small object, while the floodlight covers a larger area. Colour fittings may also be used with spotlights and floodlights. Directional fittings of this type can be used with excellent results for after-hour lighting where it is undesirable to leave all the window lights on.

## Shop Interiors

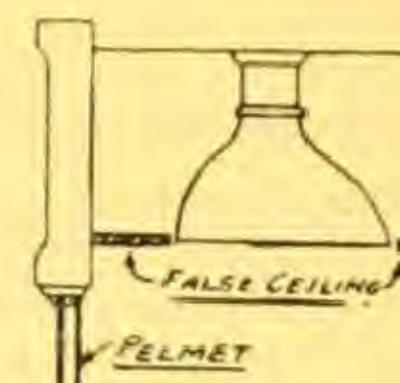
It is an established fact that a well-lighted shop interior reduces sales resistance. It is not only desirable to have enough illumination to facilitate the handling of materials, but that the intensity of illumination should induce a sales atmosphere. The old-fashioned pendant should find no place in the modern shop; the lighting it provides is crude and glaring. The amount of illumination required will, of course, depend on the character of the business.

## Architectural Lighting

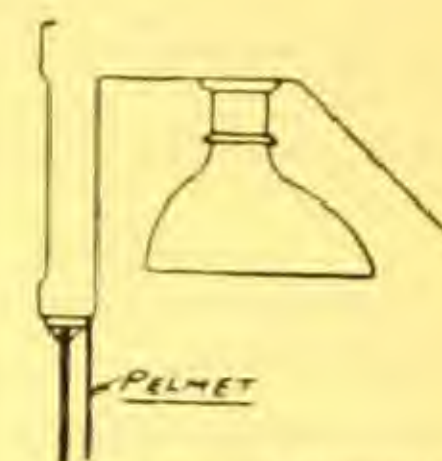
Architectural lighting is the most up-to-date of all methods of shop lighting. It is deliberately designed to form part of the main structure. With the aid of modern electric lighting it is possible to attain new effects by varying the intensity, direction, and colour of the illumination. Lighting features are embodied as an integral part of the building. Full use can be made in the shop interior of lights in the frieze, lighted panels, luminous columns and beams, and lighted doorways. When employed scientifically, it is possible to obtain high intensities of light throughout the shop without any semblance of glare.



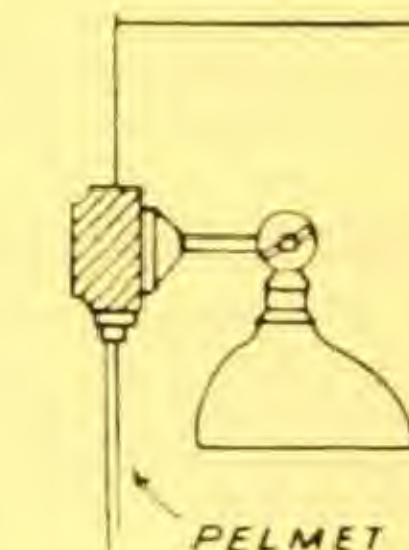
(iii) Ceiling Mounting



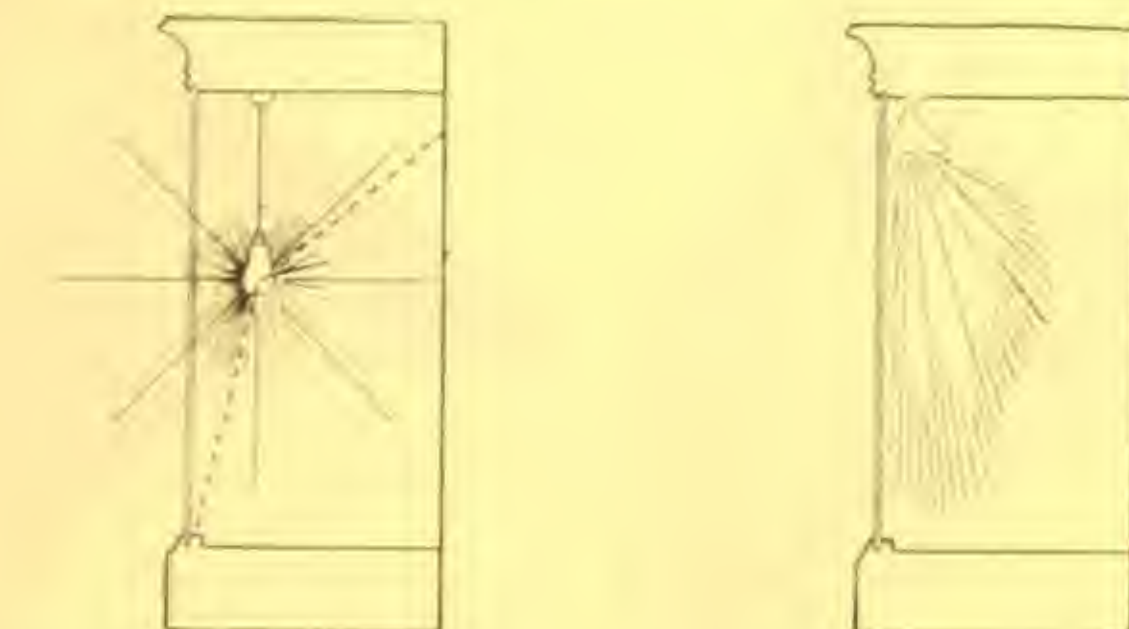
(iv) False Ceiling Mounting



(v) Recessed Mounting



(vi) Transom Bar Bracket Mounting



(i) Incorrect method—glaring and inefficient.

(ii) Correct method of light concentrated on display.

Diagram Showing Necessity of Controlling Light by Reflectors.

## Advance Planning to Architects, etc.

The Electricity Sales Branch of the State Electricity Commission of Victoria has a technical staff available for assisting architects, manufacturers, etc., in the selection of the most suitable electrical equipment for any specific service. An outline of some of the principal activities of this branch are:—

**POWER.**—The Power Sales Section deals with the application of electricity for power or heating purposes in factories, etc.

**ILLUMINATION.**—This Section functions by tendering advice on all illumination matters, and generally aims at increasing the standard of lighting. Its work covers lighting specifications for buildings, both domestic and commercial.

**RURAL.**—The Rural Section is devoted to the application of electricity to farming.

**MERCHANDISING.**—This Section covers the sale of electrical appliances for both domestic and commercial establishments.

Architects and others interested in the best utilisation of electrical apparatus are invited to communicate with the above branch of the Commission.

(Continued on next page)



## FACTORY LIGHTING

## Value of Correct Illumination

Factory lighting should not be considered merely as a necessary service equipment to enable workmen to see. Light can earn direct profits if it is used for that purpose. Abundant illumination is a producer—not a burden. It has been proved by experience that modern factory lighting will increase production, decrease departmental costs and spoilage, and prevent accidents. Poor lighting costs money, but good lighting makes money.

## Measurement of Light Intensity

Light intensity cannot be accurately judged by merely looking at the appearance of the lighted room. The only safe way to be sure of the lighting intensity is to measure it, and in this respect the foot-candle meter is the most accurate method.

The importance of measuring the lighting cannot be too strongly impressed, for therein lies the solution to satisfaction.

## Intensity of Light Required for Various Work

The minimum foot-candles required to give satisfactory illumination for various types of service in factories is given as under:—

Service	Minimum foot-candles	Desirable foot-candles
Storage rooms . . . . .	.5	.5—2.0
Rough manufacturing and other operations . . . . .	2	2—5
Fine manufacturing work . . . . .	4	4—10
Very fine work, such as embroidery, watch-making, drawing, etc. . . . .	8	8—20

## Types of Reflectors

## The Distributing Type (Fig. 1)—

The distributing type of reflector is usually of enamelled iron having a dark exterior and a white interior. It is of large diameter and is capable of distributing an even intensity of light over a large area, thus allowing of greater spacing of the lights.

## The Concentrating Type (Fig. 2)—

This type of reflector is usually employed where it is desired to increase the light intensity at a particular machine or spot without increasing the general intensity of light throughout the whole factory. It is usually of comparatively small diameter and has either a bright white or polished surface inside. The reflector should be of a depth sufficient to conceal the lamp from the naked eye.



Fig. 1  
Distributing Type.



Fig. 2  
Concentrating Type.



Fig. 3  
Parabolic Type.



Fig. 4  
Elliptical Type.

REFLECTORS.

## The Parabolic Angle Reflector (Fig. 3)—

This type of reflector is designed for lighting both horizontal and vertical areas from a side position. This reflector can also possess the qualities of either the distributing or the concentrating type.

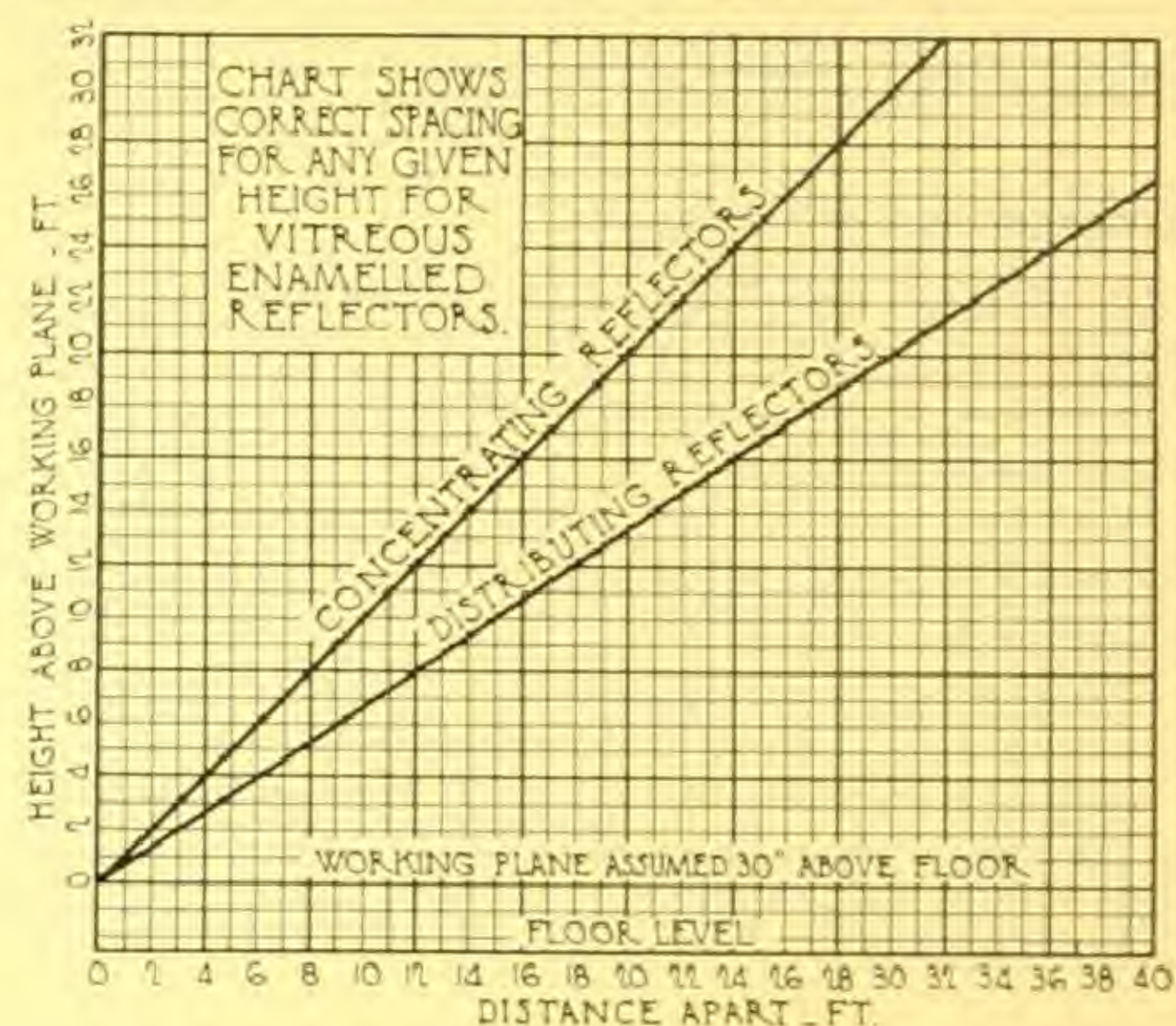
## The Elliptical Angle Reflector (Fig. 4)—

The elliptical angle reflector is used in cases where machinery, such as travelling cranes, etc., occupies the centre of the space and it is therefore impossible to hang lighting units other than at the sides of the space. This reflector, which has a wide lateral distribution, provides a very even intensity over the space to be illuminated.

## Spacing and Mounting Height

The following chart will assist in the correct spacing and mounting of various types of reflectors. It will be seen that the distance between properly installed reflectors is in constant proportion to the mounting height. This ratio remains constant for all sizes of reflectors of any one type, but the ratio of each type is different from that of the others.

The correct spacing is obtained by locating the intersection of the horizontal line, representing the mounting height, and the diagonal line, representing the type of reflector.



## Lighting Service

The State Electricity Commission of Victoria maintains an Illumination Section, which at all times is ready to give free service in the way of lighting lay-outs, specifications, etc.





# WM. BEDFORD LIMITED

476-90 LITTLE LONSDALE STREET  
MELBOURNE

ELECTRIC LIGHT FIXTURES

31f

S.A.A. File No.

[For Other Products, See Pages 137, 164, 246, 328]

## Products

Electroliers of any size, pendants, internal and external brackets, newels, floor and table standards, verandah and pier lights, ceiling lights, internal and external lanterns, candlesticks, etc.

## Manufacture

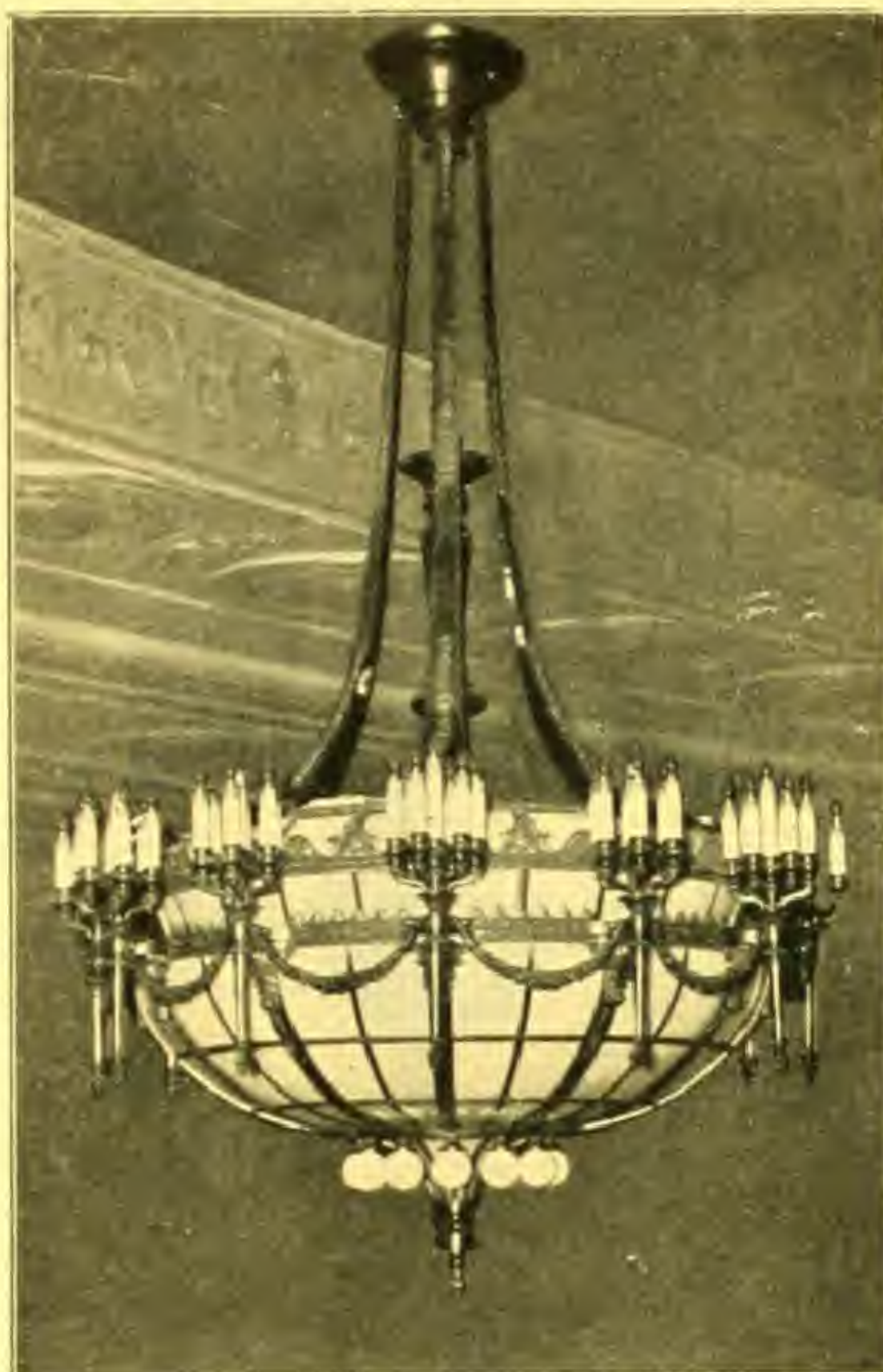
As manufacturers of bronze electric light fixtures, Wm. Bedford Limited stand alone in the Continent of Australia.

The chandeliers at the Regent Theatres, Melbourne and Brisbane, and the Palais Theatre, St. Kilda, also the huge dome central feature at the Town Hall, Brisbane, are the largest of their kind in the Southern Hemisphere.

## Designing Service

Wm. Bedford Limited's designing staff is solely engaged upon the creation of original electric fixtures. The services of the staff can be made available to those in the profession, if so desired. A consultation frequently enables fittings to be produced in the most economical and satisfactory way.

Wm. Bedford Limited employ only the most skilled artisans, and, in consequence, Architects



The Auditorium Chandelier, Regent Theatre,  
Collins Street, Melbourne.  
C. H. Ballantyne and Associates, Architects.

may be assured that their exclusive designs shall be made up completely in accordance with the detail and to their entire satisfaction.

Fixtures of any size can be designed and manufactured, and we instance a few of the larger fittings as follows:—

Town Hall, Brisbane, Dome—  
Diameter, 16 ft.; Weight,  $\frac{1}{2}$  ton.

Regent Theatre, Chandelier—  
Height, 17ft. 6in.; Diameter, 11ft. 6in.; Weight, 1 ton.

Regent Theatre, Brisbane, Chandelier—  
Height, 17ft.; Diameter, 10ft.; Weight, 1 ton.

Palais, St. Kilda, Chandelier—  
Height, 12 ft.; Diameter, 7ft. 6in.; Weight,  $\frac{1}{2}$  ton.

Reliable judges have stated definitely that Bedford's fixtures are equal, if not, superior to any turned out in other parts of the world. There is a limitation in design and range to the imported fixtures, which means that the purchaser cannot be sure of exclusive designs, nor have sufficient range for selection.

The services of Bedford's designers are at your disposal; use them for the Theatre job—the Hall—the Church—and the Home—and insist upon having your creations exclusive to yourself.

## LIST OF INSTALLATIONS

The following is a list of the more prominent Theatres erected in the last few years equipped with Wm. Bedford Limited's fixtures:—

Palais Theatre, St. Kilda. H. E. White, Architect.  
New Comedy Theatre, Melb. C. N. Hollinshed, Architect.  
Regent Theatre, Melbourne. C. H. Ballantyne & Associates, Architects.  
Plaza Theatre, Melbourne. C. H. Ballantyne and Associates, Architects.  
Regent Theatre, Brisbane. C. N. Hollinshed, Architect.  
Regent Theatre, Fitzroy. C. N. Hollinshed, Architect.  
State Theatre, Melbourne. Bohringer, Taylor & Johnson, Architects.  
State Theatre, Sydney. H. E. White, Architect.  
Civic Theatre, Auckland, N.Z. Bohringer, Taylor & Johnson, Architects.  
Palmerston North Theatre, N.Z. C. N. Hollinshed, Archt.  
Plaza Theatre, Sydney. Heath, Architect.  
Municipal Theatre, Newcastle. H. E. White, Architect.

The following Halls, Clubs, Churches, etc., are a few to which Bedford-made fixtures were supplied:—

Town Hall, Brisbane. Hall & Prentice, Architects.  
Masonic Hall, Brisbane. Atkinson, Powell & Conrad, Architects.  
T. & G. Buildings, Sydney. A. & K. Henderson, Architects.  
T. & G. Buildings, Melb. A. & K. Henderson, Architects.  
Bank of N.S.W. Robertson & Marks, Architects.  
Yarra Yarra Golf Club. Plottel, Bunnet & Alsop, Arch'ts.  
Lake Karingup Country Club, W.A. E. & R. Summerhayes, Architects.  
Lister House, Adelaide. F. Kenneth Milne, Evans & Russell, Architects.  
Athenæum Club. C. H. Ballantyne & Assoc., Architects.  
Howey Court. M. R. Barlow, Architect.  
Roman Catholic Church, Essendon. T. A. & T. G. Payne, Architects.  
Coburg Town Hall. C. R. Heath, Architect.  
Etc.  
Norwich Union Buildings, Adelaide. F. Kenneth Milne, Evans and Russell, Architects.

(Continued on next page)



## ELECTRIC LIGHT FIXTURES

Illustrations on these pages are typical of the electric light fixtures for internal and external use, which Wm. Bedford Limited can supply.

The range of stocks includes many fine examples of decorative art as applied to electric lighting and styles to suit any style of architecture or interior decoration.

See Catalogue for other types.



B 475.  
EXTERIOR LANTERN  
BRACKET.

Verde Green on Brass or  
Black (Spanish) Finish.  
Lantern, 7½ x 10½ in.  
Back Plate, 15 x 7 in.



Pat. No. 24784/30.  
A tendency toward the Art Moderne.  
This unique modern fixture manu-  
factured in all styles and sizes.



B 457.  
CAST BRASS  
TORCH  
BRACKET.  
Complete with  
6 in. Opal Globe.  
Height (overall):  
18 in.  
Projection: 9 in.  
Back Plate: 4½ in.



B 486.  
EXTERIOR  
WALL BRACKET.  
Verde Green on Brass or  
Black Italian Finish.  
Back Plate, 9 x 4½ in.



B 507.  
CAST BRASS  
VERDE GREEN  
ITALIAN  
PIER LIGHT.  
Height, 24 in.  
Width, 10 in.



B 461.  
CAST  
BRASS  
ADAMS  
BRACKET.  
Projection, 11½ in.  
Height Overall, 21 in.  
Oval Back Plate,  
6 x 5 in.



ELECTRIC LIGHT FIXTURES  
PENDANTS AND TABLE LAMPS



B 545.  
CAST BRASS  
TABLE STANDARD.  
Height, 12, 17, 20 in.



FOUR-TIER, TWENTY-  
FOUR LIGHT, CAST  
BRASS JACOBAN  
ELECTROLIER.

B 527.

Spread Top Tier, 20 in.;  
Second Tier, 25 in.; Third  
Tier, 33 in.; Bottom Tier,  
41 in.



B 548.  
MOCK TWIST  
BRASS JACOBAN  
STANDARD.  
Height, 12, 17, 20 in.



B 529.  
SIX-LIGHT CAST BRASS  
GEORGIAN PENDANT.  
Height, 24½ in. Spread, 34 in.



THREE-LIGHT  
ADAMS CAST BRASS  
PENDANT.

B 510.

Height, 14 in.  
Spread, 14 in.

(Continued on next page.)



## MODERN HOME LIGHTING FIXTURES



A.22.

Back Plate, 15 in. dia.  
Spread, 9½ in. dia.  
Projection, 5 in. dia.



A.7.

Back Plate, 10 in.  
Spread, 4½ in.  
Projection, 5 in.



A.15.

Back Plate, 5 in. dia.  
Spread, 7½ in. dia.  
Projection, 3½ in. dia.



A.13.

Back Plate, 4½ in. dia.  
Spread, 11½ in. dia.  
Projection, 5½ in. dia.

With the advent of the modern and Spanish Mission influence in recent domestic architecture, came the necessity for using bright, attractive and appropriate light fixtures to harmonise with the general decorative scheme. As the Spanish Mission influence was introduced into very modest residences, the price of the fixtures had to be in proportion.

Wm. Bedford Limited has an excellent range of these fixtures (a few of which are illustrated), and are priced so reasonably that they can be specified in the most moderately-priced villa.

## Finishes

As the fixtures are made in brass and bronze, they particularly lend themselves to any of the following finishes:—Brass, Old Brass, Polochrome, Bruno, Florentine, Florentine Verde Relieved, etc.; in fact, in any finish, including Oxidised Silver, but the latter is extra.



A.16.

Back Plate, 9½ in. dia.  
Spread, 10½ in. dia.  
Projection, 4½ in. dia.



A.26.

Back Plate, 11½ in.  
Spread, 9½ in.  
Projection, 5 in.



B.444.

Back Plate, 10½ in. x 5 in.  
Projection, 5½ in.  
Spread, 9½ in.



A.2.

Back Plate, 9½ in.  
Spread, 9 in.  
Projection, 4 in.

FOR OTHER FITTINGS, SEE CATALOGUE.



## GRACE BROS. LTD.

BROADWAY, SYDNEY

NEW SOUTH WALES

## ELECTRIC LIGHT FITTINGS

ELECTRICAL DEPARTMENT—BASEMENT, GEORGE  
STREET WEST BUILDING

31f

S.A.A. File No.

"SURE  
TO GET  
IT AT  
GRACE  
BROS."

[For Other Products, See Pages 265, 305 and 490]

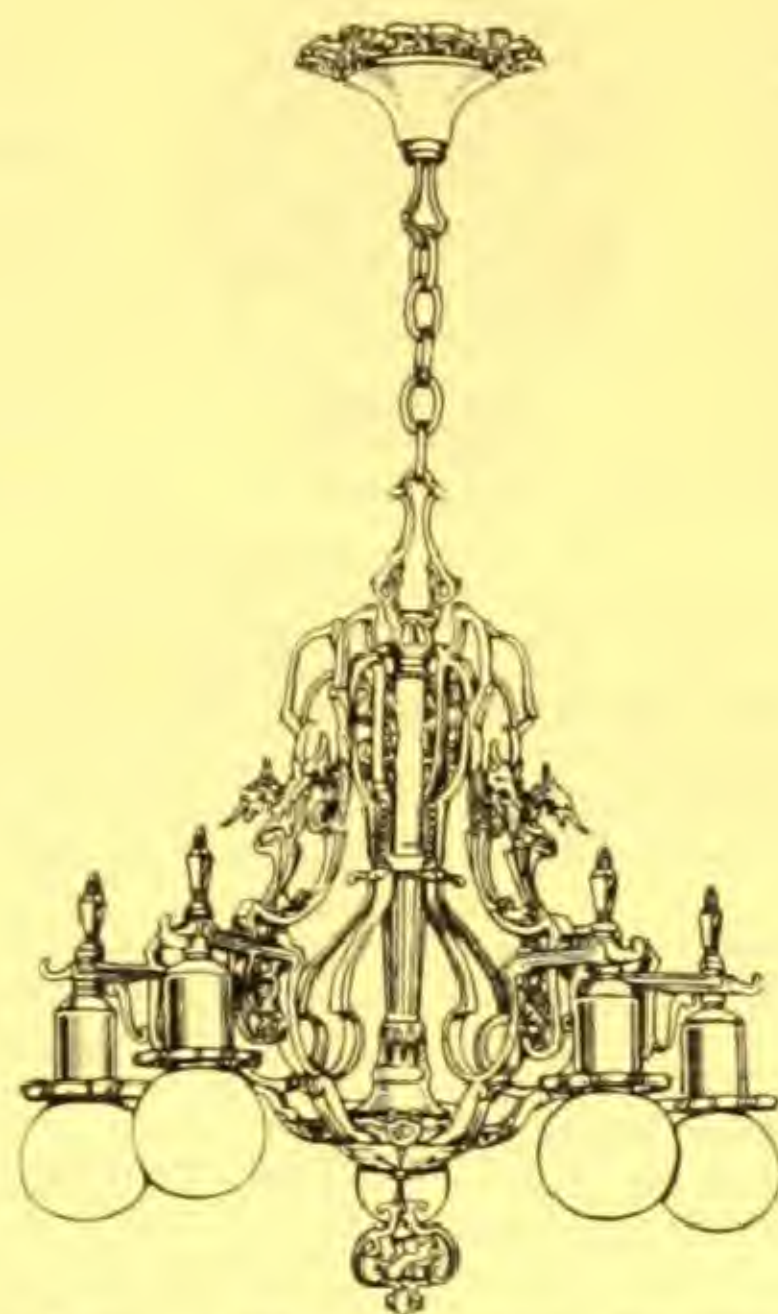
The Decorative Quality of  
Bronze

One has but to look about in everyday life to notice that the metallic architectural details of our public buildings, our statues, and, in fact, every place where absolute permanency is of prime importance, bronze has been resorted to. Appearance, it will be noted, is improved with age.

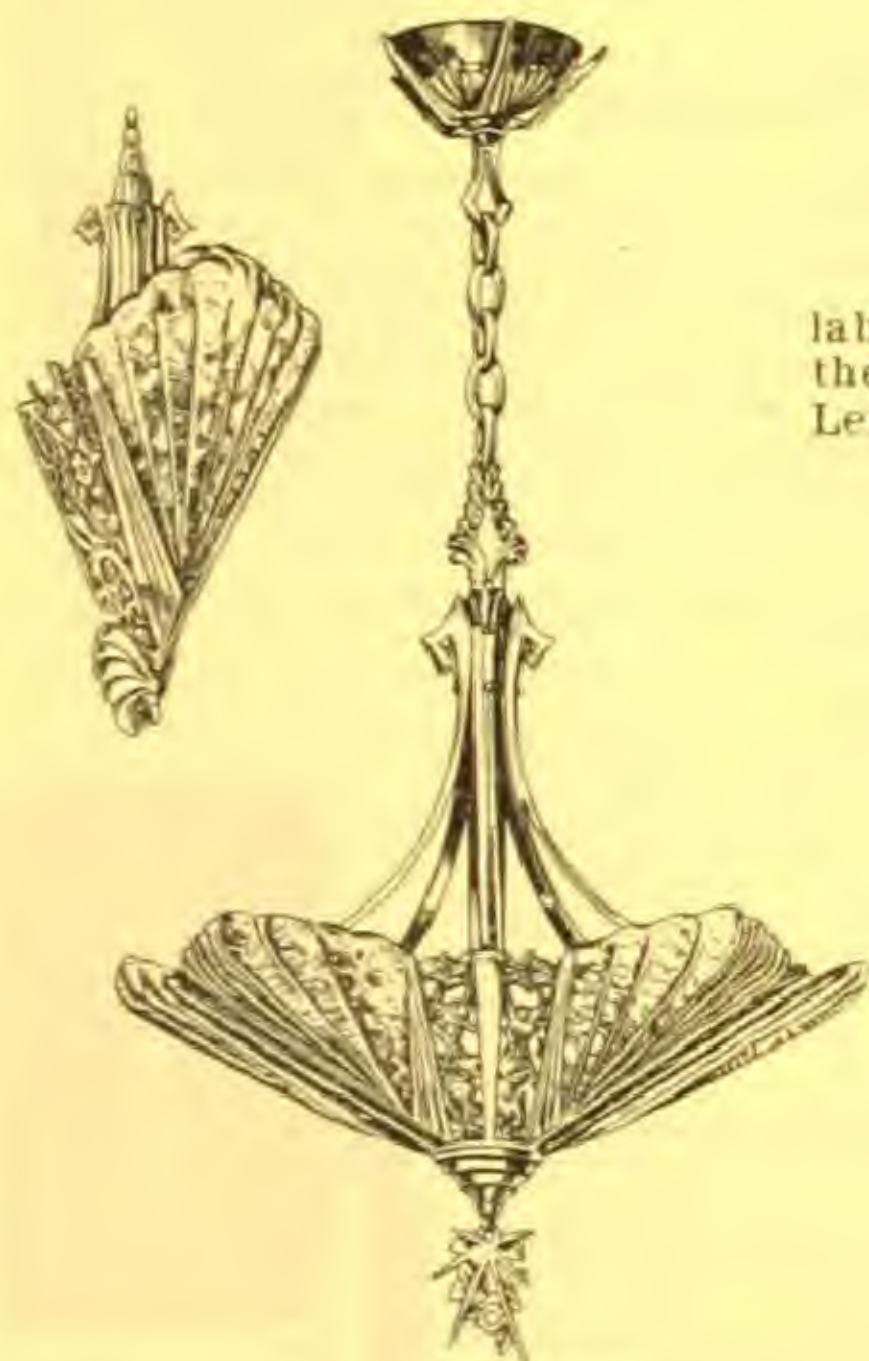
Bronze Applied to Lighting  
Fixtures

In the realm of the baser metals, bronze is supreme, and its use has been restricted in latter days to the mansion on the hill, only because of its high cost.

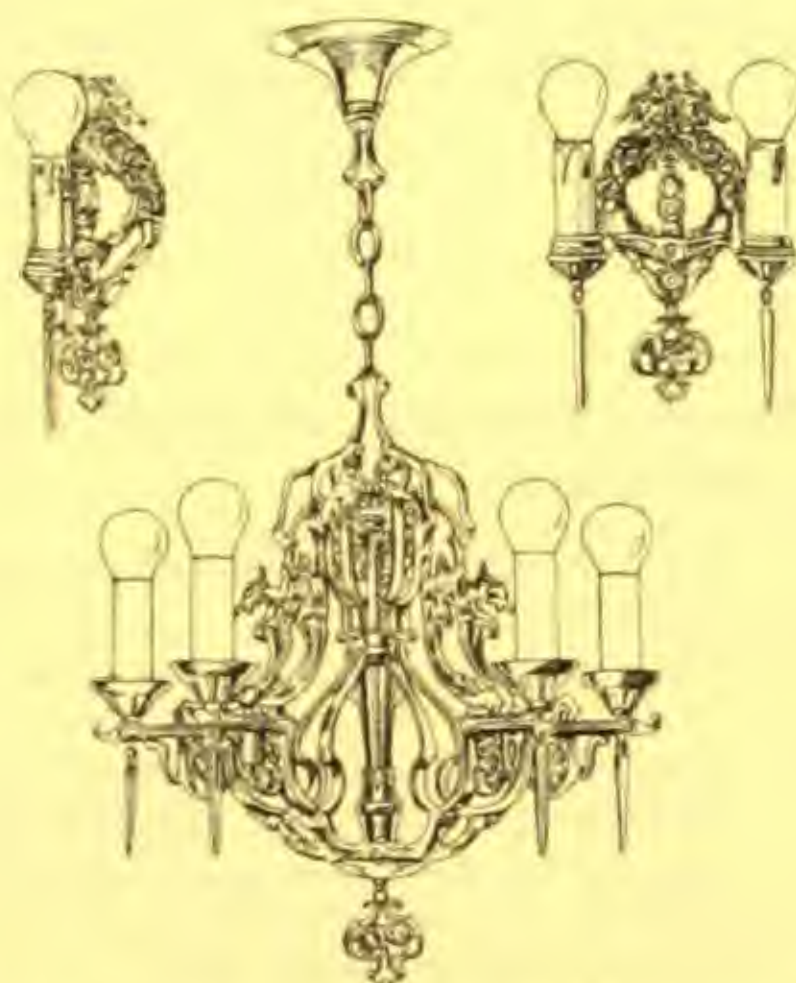
To-day we bring you solid cast bronze fixtures of marvellous beauty, at prices only slightly higher than the ordinary kind, and because of their accurate design, give scientifically correct lighting.



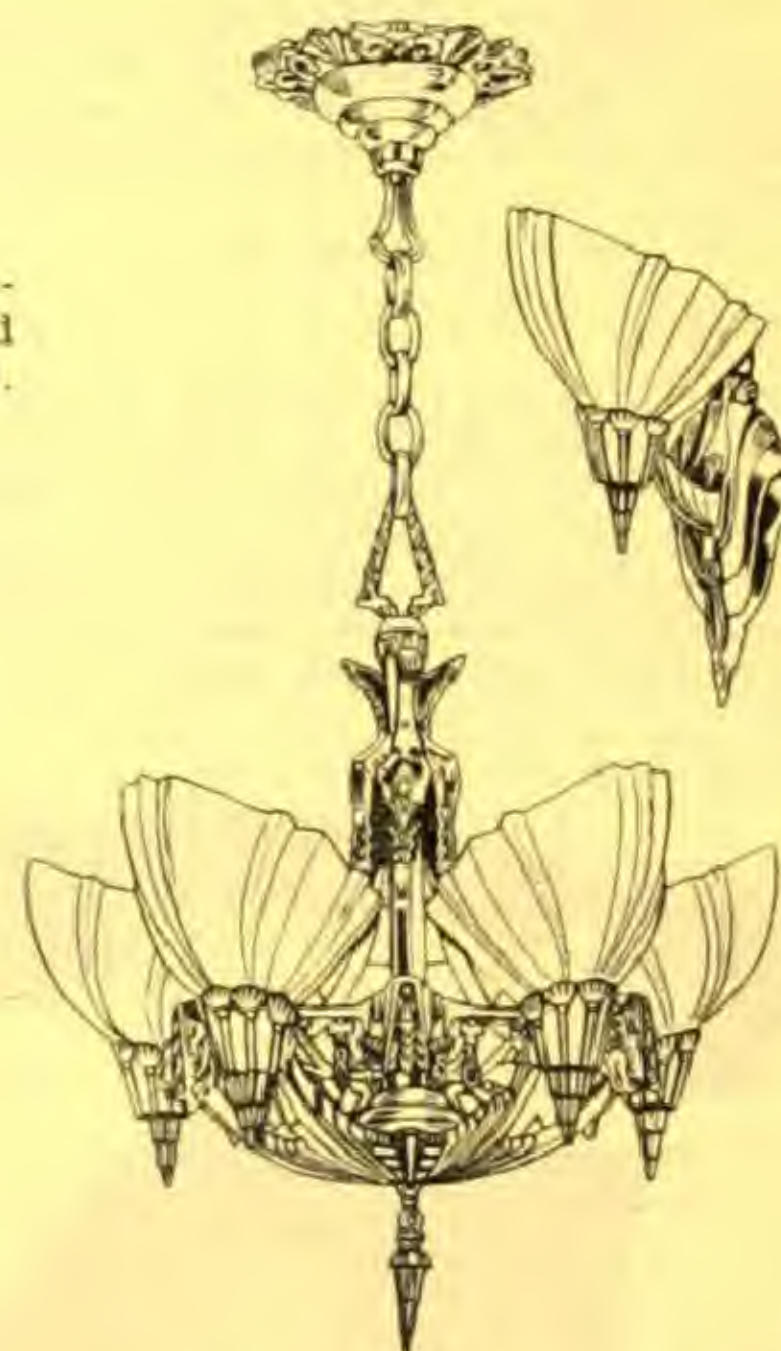
No. 5005.—"Renaissance" Inverted Candelabra. Cast in solid bronze. It is everlasting, and the beauty of detail and design is unsurpassed. Length 36in., spread 21in.



No. 505.—"Futurist" Five-Light Fixture. A new combination in modern art bronze and amber glass. Spread 20 in., length 33 in. Single-Light Bracket to match.



No. 5006.—"Renaissance" Candelabra. An authentic example of the craftsmanship of recognised periods—which never go out of style. Five lights; length 36in., spread 21in. Single bracket, double bracket.



No. 905.—"Beaux Art" Five-Light Fixture, with Frostelle Glass. Spread of glass 20in., length overall 36in. Cast in solid bronze. Single-Light Bracket to match.



31i	<b>NEW SYSTEM TELEPHONES PTY. LTD.</b>			<b>NEW SYSTEM</b>
	181-183 KING STREET, MELBOURNE. Tel. M 3191.	280 CASTLEREAGH STREET, SYDNEY. Tel. M 6425.	22 PULTENEY STREET, ADELAIDE. Tel. C. 6676	
Works: Hollingsworth Works, West Dulwich, London.				

[For Other Products, See Page 438]

### Products

British-made private Telephones of various types, including Press-button Inter-office telephones, the "Direct-a-phone" (loud speaker telephone system), Private Automatic Exchange telephone systems, the Laryngaphone (noise proof) telephone, Signalling systems to work in conjunction with, and apart from, telephone systems, Princes (New System) battery-operated Electrical Clocks, consisting of "Master Clock," operating subsidiary or "Slave" Clocks; all types of alternating current clocks, New System Radio Broadcast Receivers, distributors of Electrice Australian-made Refrigerators.

### Manufacture

Only the most skilled workmanship is employed, and the best material procurable used by the New System British and Australian factories in the manufacture of standard New System telephone, clock and radio apparatus.

The utmost care in manufacture is essential to enable the New System organisation to maintain its high reputation for service.

Products of other manufacturers handled by the New System organisation must conform to the New System standard of quality, so that every line offered by New System may be accepted as representing the best of its kind.

### Service

Service being the keynote of the New System business policy, expert staffs for the installation and subsequent servicing of telephone, clock, radio and refrigeration systems are maintained at each branch of the New System organisation, whilst specialists in all sections of New System activities are available without obligation to suggest, advise and quote.



Illustrating 5-way Press Button Type Desk Telephone.

### Special Features of Press Button Type Instruments

1. No Switchboard operator is required for making connections.
2. One operation only of the instrument gives connection to the required department.
3. Each instrument is fitted with Hand-combination Telephone: the most convenient type for general use.
4. Special facilities can be provided if desired, such as Secret lines, Round-call signalling, Extension or Loud-ringing Bells, etc.
5. "Conference" and Priority facilities can be given.
6. Extensions may be readily added at any time.
7. In noisy departments the telephones can be fitted with patent noise-excluding "Laryngaphone" handsets.
8. Service is guaranteed and Maintenance is free.



### Press Button Type Inter-Office Telephones

Of robust construction to stand up to the "ALL-TIME-EFFICIENCY" guarantee which goes with every New System telephone installation; simple to operate, ensuring the maximum of use, and of handsome appearance, over 250,000 of these telephones have been installed and are maintained by the New System organisation.

### Operation

There being no central switchboard, each instrument, in effect, acts as its own exchange. To make contact with any desired point, it is only necessary to lift the hand-combination telephone from the cradle of a desk instrument, or the hook of a wall instrument, and depress to the fullest extent the button corresponding with the name of the person or department required. On completion of a conversation, the replacing of the hand-combination telephone on cradle or hook automatically restores the instrument to "normal."

### The Telephone Instruments

have compact casework of well-seasoned, polished walnut. They are equipped with the requisite number of calling buttons, suitably marked by engraved labels to indicate the various departments to which connections may be made. Each instrument is provided with hand-combination telephone fitted with a special hygienic transmitter. The signalling arrangement consists of a buzzer for Desk Instruments, but for Wall Instruments either a bell or buzzer can be supplied.

Desk and Wall Instruments are made up in the following standard sizes:—

- 5-way,
- 10-way,
- 15-way, and
- 20-way.



Illustrating 10-way Press Button Type Wall Telephone.



### The Cabling

All connections between the instruments are provided by special LEAD-COVERED MULTIPLE TELEPHONE CABLE of first-grade British manufacture. The copper wire conductors in the cable have three coatings of insulation, i.e., enamel and two layers of cotton; the whole being wrapped in linen tape and impregnated in paraffin wax. This insulation, combined with the heavy lead sheathing, makes the cable moisture-proof, and fit to carry the New System ALL-TIME-EFFICIENCY GUARANTEE.

### The Battery Supply

consists of a central set (or sets) of high-capacity dry cells.

### Junction Boxes

are supplied where necessary to link up the various cables and to provide a ready means for extending an installation.

### Transmission

Transmitters are of extreme sensitivity, ensuring perfect transmission and reception of speech between the instruments.

### Round Call

A Round Call, or code call system, can be easily incorporated in any standard type of New System telephone installation. Round Call signalling is of distinct advantage when one or more people require to be accessible to all departments of a business at any time. It consists of a special Round Call Key on each telephone instrument, and a distinctive sounding bell in each department. Pressure of the Round Call Key in accordance with the arranged ringing code rings the Round Call Bell at each instrument the requisite number of times, and the required person then goes to the nearest instrument, depresses the Round Call Key and speaks.

### Service to Architects

The fullest expert collaboration without obligation.

## THE "NEW" SYSTEM PRIVATE AUTOMATIC EXCHANGE



A Fifty-line  
Wall Type.

The case is  
of Polished  
Walnut.

### THE METHOD OF CALLING.

The Calling Dial is engraved with the numbers of the other points of the installation. To make a call the dial is turned by means of a milled knob until the number required is opposite a pointer on the left of the dial, and the handset lifted from the cradle or switch-hook.

If the wanted line is free, a continuous buzz will be heard. If the line is engaged, the "Receiver" will be silent, in which case the caller can replace his handset—so restoring the line to normal—or he can "hold" the line until the distant station is disengaged, when he will be immediately connected, without further operation, and without having to endure listening to an irritating "busy" signal.

### TO ANSWER:

Simply lift the "handset" and speak.

It should be noted that the "called" station cannot ring-off until the caller replaces his handset, so that premature disconnection is impossible.

This system is designed to give automatic intercommunication facilities between any number of stations up to 75 lines. The P.A.X. Switchboard is made in three sizes—25-line, 50-line, and 75-line—but all switchboards can be equipped initially for any smaller number of connections and extended as required.

### GENERAL ADVANTAGES of the "NEW SYSTEM" P.A.X.

1. Its simplicity is the chief reason for its reliability and high efficiency. The switchboard itself is practically immune from trouble because of the absence of Master Switches, Connectors and "key" relays.
2. Secrecy of conversation is assured under all conditions.
3. No "trunk" system being employed, every line can be in use simultaneously. No other Automatic Exchange gives this facility.
4. Only one setting of the dial is required to secure a connection. There are no signals, either Visual or Aural, to be observed before dialling. There are no "ringing machines" to start up, nor apparatus to be operated on completion of dialling. The moment the number has been selected, the distant station is connected.
5. The dial indicates the number being selected, thus reducing the possibility of calling the wrong line. No other Automatic Exchange allows this to be done.
6. The setting of the dial can be altered to correct a wrong choice of number. This cannot be done on any other Automatic Exchange.
7. No inadvertent movement of the dial can disconnect the selected line.
8. A Numerical Directory Card is attached to each telephone.
9. It gives continuous day and night service.
10. No Switchboard Operator is required, therefore the P.A.X. can be installed in positions unsuitable for a manually operated board.
11. Extra lines can be added to the installation without interfering with existing apparatus or interrupting the service.
12. Full automatic intercommunication between two installations having separate switchboards in different buildings can be given.
13. In the rare event of trouble, it is invariably confined to one line; the remainder of the system continuing to work. There are only three possible sources of faults: (1) The Line Selector; (2) The Instrument; (3) The Line. In the case of (1) and (2) the faulty member can be replaced by a spare in a few moments, while the remedy for a fault on the line is obvious.
14. The Line Wipers operate with a rubbing contact and are, therefore, self-cleaning.
15. Current consumption is low. The space required for accommodating the batteries is, therefore, reduced to a minimum.



A Fifty-line Desk Type.  
External parts have an  
oxidised copper finish.

### THE TELEPHONES.

The telephones supplied to work in conjunction with the "New System" P.A.X. are of robust construction and notable for their simplicity of operation; one setting of the dial secures connection to a wanted line.

An outstanding feature of their design is the line-selecting commutator which eliminates the usual impulse springs, so frequently the cause of "wrong numbers" by reason of their unavoidable frailty.

The receiver and transmitter are combined in one fitting—the Handset—an arrangement of proved convenience and efficiency. It gives freedom of movement to the user, allowing him to turn from the instrument if he desires to refer to books or papers on his desk. A hygienic cover prevents the collection of dust and moisture in the mouthpiece without impairing clarity of speech. Buzzer calling is standard to both Desk and Wall pattern telephones, but Bells can be fitted if desired.

The method of making a call is simpler than that employed on any other type of Automatic Exchange telephone.

(Continued on next page)



**ADDITIONAL FEATURES.**

The usefulness of the "New System" P.A.X. does not stop at the provision of a reliable means of communication between a series of scattered points. Numerous features can be added to the system to give further services calculated to save time, and facilitate the routine of a business house or other institution.

For instance:—

**PRIORITY OF CALL.**

The "New System" Priority of Call feature will give a Principal instant access to any line, even if it is engaged. No operation beyond dialling in the ordinary way is required of the caller. The Principal alone is able to break into a conversation.

**CONFERENCE LINES.**

Incidental loss of time entailed by the conferences so necessary between the Principal of an organisation and members of his staff can be greatly reduced by the "New System" Conference Line feature. On each man being warned of a proposed conference, he dials the "Conference" line—a full discussion can then ensue between several people, without any of them leaving their desks, and without time being lost by journeys to and from the meeting room.

**ROUND CODE CALL.**

The "New System" Round Code Call is the surest and quickest method of getting into touch with Executives whose duties take them about the premises.

The dialling of a certain number on the Principal's instrument causes special bells or buzzers to sound in all departments. Each Executive has his own particular code call, and when one hears his personal signal, he goes to the nearest "New System" telephone and is, forthwith, "through" to his Chief.

Any number of instruments on an installation may be equipped with the Round Call feature, which may be utilised as a Works Starting and Stopping Signal, etc.

**FIRE ALARM.**

An establishment having its own Fire Brigade can add to its efficiency by adopting the "New System" P.A.X. Fire Alarm.

**PRINCIPAL'S FILTER LINES.**

The "New System" Filter Line obviates the time of a Principal being taken up by calls which his Secretary would be competent to handle.

Incoming calls can be answered in the first instance by the Secretary only.

Alternatively, when the Chief desires to originate a call, the Secretary attends to the business of getting the actual person required on the line, warning his Chief, by Buzzer or Visual Indicator, when the connection has been secured.

The Chief, may, however, deal with all calls direct at will, as the operation of a simple switch on his telephone brings the Filter Line into operation.

**LIMITED FACILITIES.**

The "Limited Facilities" feature provides for some extensions having access to certain lines only. It can be applied to any range of numbers on a system, and the lines affected may be changed or re-arranged at any time.

**DEPARTMENTAL INDIVIDUAL CALL.**

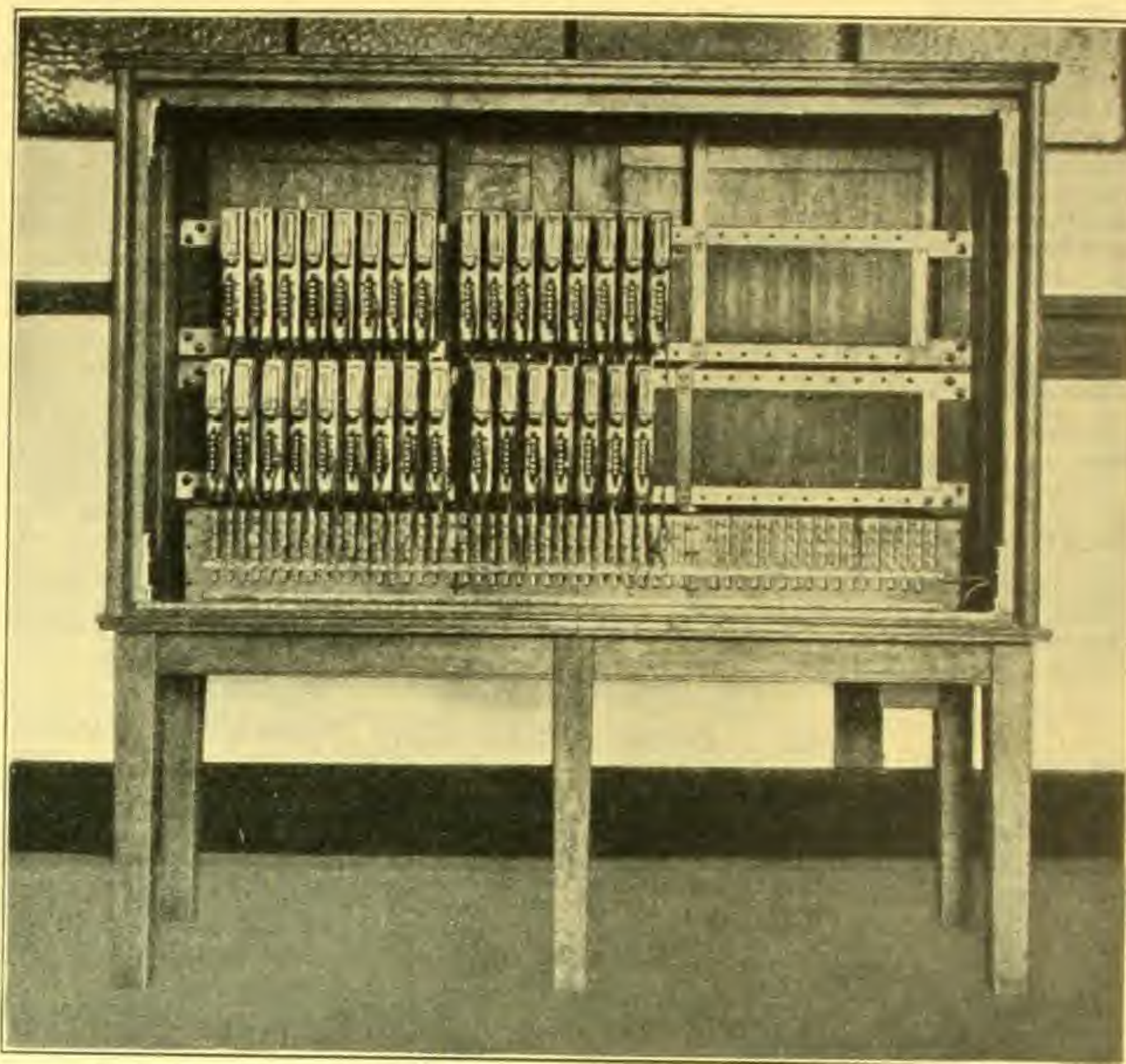
This call ensures that the man the Principal wants shall answer at once, when he makes a call to a department wherein more than one person has access to the telephone.

In all such departments each employee has a code signal of a distinctive number of buzzes. When a call is made, the department is dialled in the usual manner, and the "Individual Call" key depressed to send out the particular signal of the person required. The buzzer of the called station is interrupted each time the key is operated. Thus, only the man wanted need concern himself with attending to the telephone.

**SPECIAL REQUIREMENTS.**

Special features to conform with users' particular requirements, such as Principals' "Listening-in Lines," "Not to be disturbed keys," for Master instruments, Transmitter "Cut-out" keys and so forth, can also be readily added to the system.

The experience of our Designers and Engineers is always available for the planning and fitting of such additions, so that a perfected, simply-operated, ultra-rapid intercommunication telephone service is assured by the installation of a "New System" P.A.X.



A 50-line "New System" P.A.X. Switchboard equipped for 35 lines.



**"DOMESTIC"**  
Reply and Call  
TELEPHONES



Wall and Desk Type Instruments.

These neat little instruments are designed primarily for use in dwelling houses, but they serve equally well in Shops and Offices. Supplied for working in pairs or with a multi-line telephone of the "New System" press button type. They have cases of pressed steel, enamelled glossy black. Other external parts are copper oxidised or bright nickel-plated.

(Continued on next page)



## DIRECTAPHONE INTER-OFFICE TELEPHONES



20-Line "Directaphone" Master Station.

**DIRECTAPHONE INTER-OFFICE TELEPHONES** are comprised of Loud-Speaker, "Master" Station, and Sub-Stations. The Cabling, Battery Supply and Junction Boxes are exactly as specified for Press Button type installation.

**Master Station**

The Master Station consists of a neat polished walnut case containing a microphone sensitive to speech uttered thirty feet away, and a Loud Speaker clearly audible at the same distance. The instrument is also fitted with Line Selector keys giving connection to the sub-stations, signalling

lamps to indicate the origin of incoming calls, and an extra watch-type receiver for use when it is not desired to employ the loud speaker.

**Sub-Stations**

The sub-stations, which may be of either desk or wall pattern, are equipped with a special press-button for calling the Master Station, and the requisite number of buttons (suitably distinguished by engraved labels) for calling the other sub-stations on the system.

Each instrument is provided with a transmitter and receiver combined in one convenient fitting. The signalling arrangement normally consists of a buzzer, but a bell can be substituted in the case of wall instruments if desired. In addition, a small lamp glows when a call is received from the Master Station. The cases of the sub-stations are of polished walnut.

**Special Features**

1. The Master Station has no Receiver or Transmitter to be held.
2. The user of the Master Station has perfect freedom; he can speak and hear in any part of his room, or when using the P.O. telephone.



20-Line "Sub-Station."

3. Master Station has Priority facilities to all Sub-stations.
4. The origin of incoming calls to Master Station is indicated automatically.
5. The Master Station can hold conferences with any number of Sub-stations.
6. Each Sub-station instrument is fitted with hand-combination telephone, the most convenient type for general use.
7. No Switchboard operator is required.
8. Service is guaranteed and maintenance is free.

## THE "NEW SYSTEM" AUTOPHONE

**Special Features**

- 1—No operator is required.
- 2—All conversations are entirely secret.
- 3—High transmission value, due to the fact that 24 volts is used to operate the system, whereas 6 volts is used on ordinary inter-communicating systems.
- 4—Interrupted ringing is provided (when a station is called the bell keeps ringing at regularly interrupted periods until the wanted party answers).
- 5—An "engaged" signal is heard when the required number is engaged.
- 6—Should a wanted number be engaged, it is not necessary to hang up and call again. The calling party can merely wait and the wanted party will, on the completion of the conversation in progress, be automatically called again.
- 7—Two wires only are required between the switchboard and each extension. This feature greatly cuts down initial cable expenditure and also provides facilities for alterations and additions being expeditiously and inexpensively erected (it also permits the extending of the system by means of external private lines).
- 8—The switchboard can be operated direct from the battery, or "floated"



Autophone Wall-Type Instrument.

Autophone Desk-Type  
Instrument.

Wall and Desk Instruments with combined Receiver and Transmitter can be supplied if desired.

on the power mains, so that the system is never without energy.

- 9—12 per cent. trunking is provided as standard equipment; that is to say, that 24 'phones out of each 100 can be in use simultaneously. This is more than adequate for usual requirements, but should, in exceptional circumstances, additional trunking facilities be required, the system can be equipped with 16 per cent. trunking facilities.
- 10—The switchboard can be equipped with up to six distinct automatic code calls; that is to say, should the manager or any other important official be required, upon dialling a certain number, bells throughout your establishment are automatically operated and give out a certain sequence of signals until the desired party answers it. This facility enables you to instantly locate any official, no matter in what part of the premises he may be at the moment.

(Continued on next page.)



### Constructional Features

- 1—The "Autophone" switchboard is easily the most compact for its size, whilst accessibility of apparatus has been studied throughout. The chassis is exceptionally strong, and all the wearing parts of switching apparatus are rugged, and have a large "factor of safety."
- 2—There are no "selectors" and "magnets" of the earlier type, or similar to those used in many other systems, in the "Autophone." The elimination of these greatly reduces current consumption, and also wear and tear. "Rotary switches" are employed throughout, and the wipers of these have, also, split double contacts, and are so designed that, whilst the necessary flexibility is provided, they will at all times retain their tension.
- 3—Minimum number of relays which are all of uniform design, being of the "knife edge," which has been proved by far the most satisfactory type of relay, and, throughout the switchboard, the armatures are used for mechanical functions only, whilst all the contacts of the springs have double contact points, thereby minimising the possibility of dirty contacts, which is the bugbear of automatic telephony, whilst, in a few instances, such as the pole changer (which provides the ringing current), and two other relays where heavy current is required for a short period, exceptionally heavy alloyed contacts are provided. All relays are "balanced," so that equal spring tension is applied over the whole area of the armature. This ensures regular, uniform, and reliable action of all relays, whilst, throughout the whole system, "there are no make before break contacts." All contacts are either simple "break," "make," or "break and make" type. The heat coil fuses are of unique design, and, when operated, actuate an alarm signal. They are of the automatic "re-setting" type.
- 4—There are many other attractive features, such as self-recording of calls and faults, etc., but these can be demonstrated to you at your convenience.

### Instruments and Accessories

The switchboards are made up in various sizes, viz., 10, 25, 50, 100, 200 or more lines. The instruments are standard type, either wall or desk, and are similar to those supplied by our Parent Company to the British Post Office. The system is equipped with a large 24-volt accumulator battery.



Standard No. 1  
Laryngophone  
Hand-set.

### THE LARYNGAPHONE

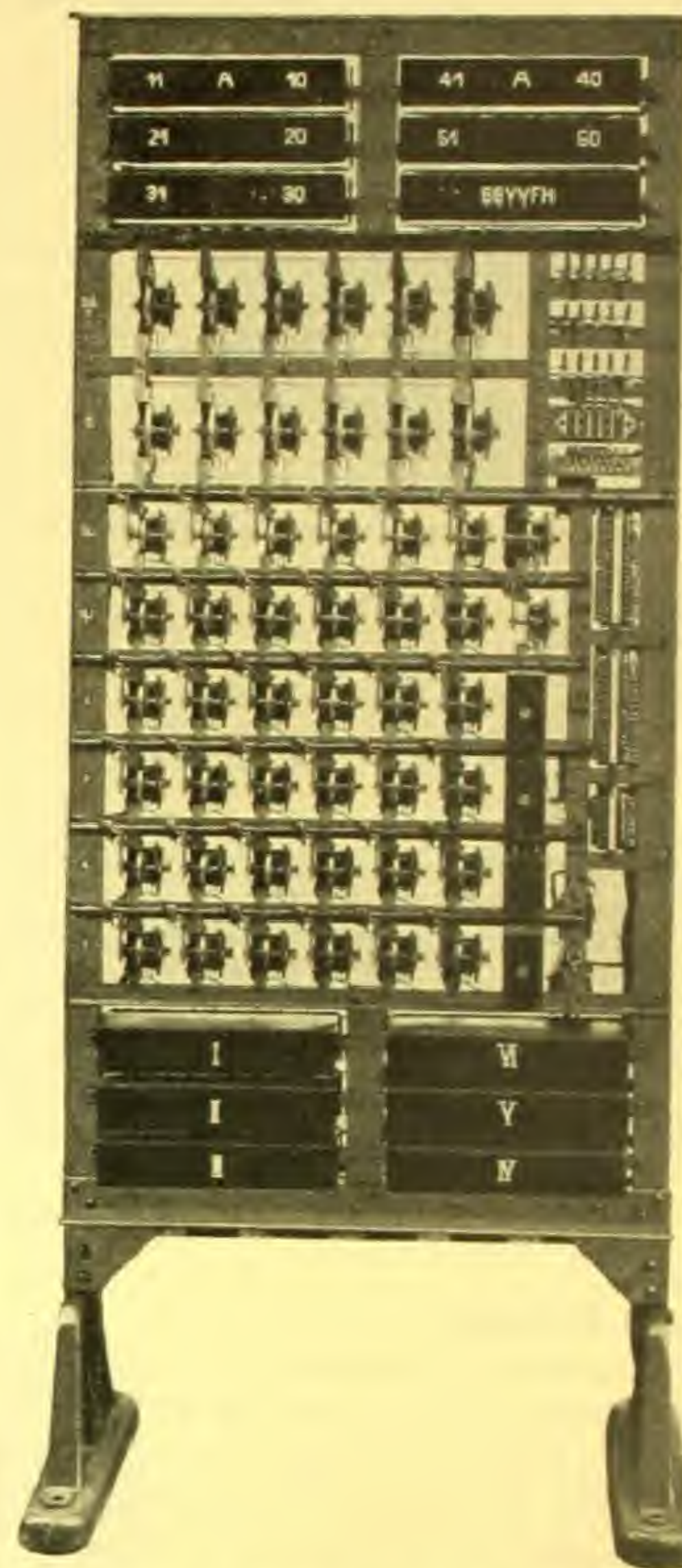
A perfect noise-excluding telephone for use in Power Stations, Factories, or in any circumstance where noise prevents the use of an ordinary telephone.

The Laryngophone excludes all extraneous noises, transmitting only the sound of the speaker's voice. It is operated directly by the mechanical vibrations of the vocal chords, picked up from the walls of the throat or cheek.

#### Operation

Press transmitter pad lightly against throat or cheek and speak in normal conversational tones.

The Laryngophone can be fitted for use with any standard type of telephone instrument.



50-Line Autophone Switchboard.

### ESSENTIAL DETAILS FOR AUTOMATIC EXCHANGE INSTALLATION

- (1) Suitable and easily accessible compartment for housing Switchboard.
- (2) Provision of power point for charging panel.
- (3) Number of connections required initially.
- (4) Ultimate number of connections expected to be required.



# STANDARD TELEPHONES AND CABLES (A'SIA LTD.)

31i

Registered Office: 71 YORK ST., SYDNEY

Works: CHIPPENDALE, SYDNEY

Interstate Agents:

VICTORIA—Mr. C. R. Foster, 588 Bourke Street, Melbourne.

QUEENSLAND—Brisbane Electrical Co., 47 Elizabeth Street, Brisbane.

SOUTH AUSTRALIA—Messrs. Unbehaun &amp; Johnstone Ltd., 98-100 Currie Street, Adelaide.

WEST AUSTRALIA—Messrs. Unbehaun &amp; Johnstone Ltd., 383-387 Murray Street, Perth.

TASMANIA—Medhurst &amp; Sons, 95 Collins Street, Hobart.

INTER-OFFICE  
PHONES

S.A.A. File No.

## Products

Inter-office telephones, private automatic telephone exchange systems, magneto telephone exchanges, and all classes of telephones and radio communication appliances.

Teleprinters ("The electric messenger") for transmitting typewritten messages by wire to one or more distant points.

## Inter-Office Telephone System

STANDARD inter-communicating telephones are especially manufactured and guaranteed to give quick and reliable communication between offices, departments and employees. Types, designs and circuits are manufactured to fill every requirement under all conditions, in new or old buildings, in offices, private residences, hospitals, ships or factories. Our valuable

and extensive experience in the telephone field, also the engineering skill employed, enable us to offer equipment which has proved its efficiency and reliability under most severe operating conditions.

## Preliminary Service to Architects and Engineers

Our Service includes practical demonstration of the operation of the systems to Architects and Engineers or Owners; complete co-ordination with the Architect or Engineer in the laying out of conduit and other details connected with the installation of the system.

## Installation

We carry out the entire installation from the wiring to the mounting of telephones—and will undertake such installation work as sub-contracts in any part of the Commonwealth.

## INTER-OFFICE TELEPHONES

### SYSTEM NO. 1—

#### Selective Ringing, Common Talking

#### Service

Each station can select and ring any station without disturbing others; as many conversations as there are pairs of telephones can be carried on at one time without interfering with, or being overheard by, the other. Instruments, either table or wall type, are made in standard sizes, namely, 6, 12, 16, 20 and 24 line.

#### Key Box

THE KEY BOX is finished in dull black enamel and is provided with the necessary number of push buttons for ringing and speaking purposes. It is suitable for mounting either on a wall or desk, and the handset is attached to it by means of a 6-ft. cord.

#### Cable

Special metallic circuit cable is made for each size of instrument and consists of the required number of cotton-covered enamelled copper wires twisted in pairs, one pair of 22 gauge wire for each telephone and two pairs 18 gauge wire for battery wires, and two spare wires for emergency use. Cables are furnished in two grades of outer covering, viz., lead-sheathed for use in outdoor or damp situations and fireproof braided for dry interior positions.

#### Particulars of Cables

Size of instrument.	No. of pairs 22 gauge.	No. of pairs 18 gauge.	External diameter of lead-covered cable.	External diameter of braided cable.
6	7	2	.53 in.	.45 in.
12	13	2	.62 in.	.55 in.
16	21	2	.70 in.	.62 in.
20	25	2	.75 in.	.67 in.
24		2		



12-Line Key Box, with Handset

The cables can be run beneath the floors, on the skirting, picture rails, or in the walls, and are joined together by means of special cable terminals. In new buildings it is highly desirable that concealed conduit pipes of sufficient diameter be provided.

## Cable Terminals

A cable terminal should be used wherever a junction is to be made between cables, for example, where an outside lead-covered cable is connected to an interior cable, or wherever a branch is taken off from the main cable. By a judicious use of cable terminals economy can be effected in the quantity of cable required.

## Dimensions of Cable Terminals

Length (inches)	Width (inches)	Depth (inches)	Use with buttons
14	5½	2½	16, 20 and 24
8	5¼	26	6 and 12

## Batteries

One battery of six to ten dry cells provides the current for talking and signalling. The batteries should be enclosed in a box near the centre of the system in an inconspicuous but convenient and dry place, such as on a shelf or in a cupboard. Generally a set of batteries will last from nine to twelve months, and are cheap and easily replaced.

## Round Call

This consists of the use of one button on the key box and a number of loud ringing bells placed at different points of the building. By pressing the button all bells ring simultaneously, and by the use of code rings any member of the organisation can be quickly located. On hearing his code call, the wanted person proceeds to the nearest inter-phone and answers the call from there.

(Continued on next page)



## AUTOMATIC TELEPHONE SYSTEMS

## Service

These systems are primarily intended for large installations that are beyond the capacity of the inter-phone or push-button systems, which are limited to a maximum of about 24 instruments. A small automatic telephone system is, however, manufactured, so that a choice of systems is available for smaller installations.

Automatic systems are supplied in the following standard sizes:—

- No. 7010 type—Maximum capacity, 21 lines.  
No. 7001 type—35 lines (1 unit),  
70 lines (2 units),  
105 lines (3 units),  
140 lines (4 units).

Larger equipments are available, particulars of which will be given on request.

## Special Facilities

Special services can be given by the No. 7001 System when required. These comprise code calling, priority service, fire alarm and conference facilities.

The code calling feature enables a person to be located quickly by means of bells, when away from his telephone. Upon hearing his code call, the wanted person proceeds to the nearest telephone, dials his own number, and is then connected to the person calling. Priority service enables executives or other officials to break down a connection and immediately speak to a station which was engaged.



No. 7001—Automatic Unit, with doors removed. (1st Unit of 70-line Exchange.)

## Power Plant

This consists of storage batteries and power board for charging the batteries. The No. 7001 system requires a 36-volt battery and the No. 7010 system a 24-volt battery. As the current drain is low in both systems, batteries of small capacity (20 to 30 ampere hours) only are required. Two separate batteries are usually provided, so that whilst one is operating the system the other is being charged. However, where alternating current is available for charging purposes, only one set of batteries is needed, as an automatic charging panel can then be used, which automatically cuts the charging equipment into circuit each time there are no calls up on the switchboard. This ensures the battery being in a fully charged condition at all times.

## Telephones

A choice of three types of instruments (Nos. 2712, 2713, and 2718) are available for the No. 7001 system. The Nos. 2712 and 2713 are illustrated below, as is also the No. 2688 telephone which is used on the No. 7010 system. The No. 2718 set is for wall mounting and is equipped with fixed transmitter and hand receiver.

These telephones are of the latest pattern, and have only recently been developed. They are handsome in appearance, convenient to use, thoroughly efficient, and are used in large quantities as standard instruments in the leading countries of the world.



No. 2713—Automatic Wall Telephone



No. 2712—Automatic Table Telephone

## Advantages

The advantages given by the automatic system over the multi-button and manually operated systems are:—

1. No comparatively expensive multiple wire cable to provide in connecting every telephone. Only one pair of wires are necessary to connect each instrument.
2. Additional instruments up to the limit of the capacity of the switchboard can be added as required with a minimum of expense and trouble.
3. No operator is required. Thus the operating cost is negligible compared with a manually operated switchboard.
4. The apparatus is ready for use day or night and absolute secrecy is secured on every call.
5. High speed of operation. There is no waiting, as the number is selected by the mechanism during the process of dialling.
6. The caller is instantly advised, by means of different tones, when the distant bell is ringing or when the station is engaged.
7. The apparatus is simple and economical to instal and may be housed in a position which would not be suitable for an operator.



No. 2688—Automatic Table Telephone



**SYSTEM NO. 11****Private Line****Service**

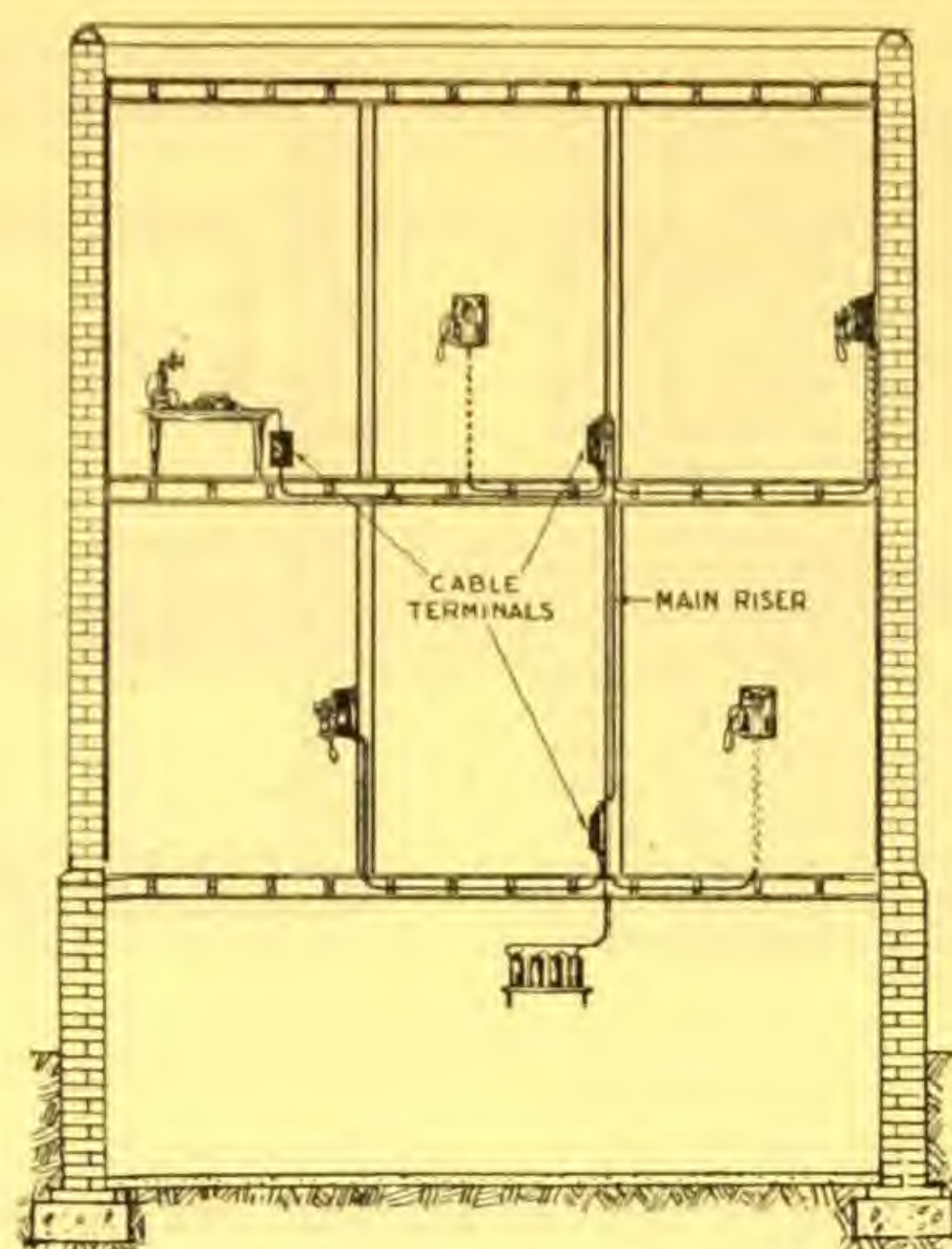
For use in residences, banks, institutions, warehouses, stores or other mercantile establishments where conversations can be limited to one at a time.

**Operation**

Each Inter-phone in the system is equipped with a number of push buttons (one for each other station in the system). By depressing the button marked with the name or number of the station wanted, the bell at that station will ring and there only. Any station in the system can selectively ring any other station. Only one conversation can be carried on at a time.

**Capacity**

The wall type Inter-phones can be furnished in capacities of 2, 3, 4, 6 and 8 buttons, accommodating 3, 4, 5, 7 and 9 stations respectively in a system. The desk and handset Inter-phones are furnished in capacities of 4 and 8 buttons, accommodating 5 and 9 stations respectively in a system.



Sectional View of Typical Installation.

**SYSTEM NO. 14****Two-Station Private Line****Service**

For use where only two stations are required and where the sets are distantly located from each other.

Only two wires are used for connecting the Inter-phones; dry cells being required at each station.

**Operation**

Either station can ring the other by simply depressing the push button of the set.

**Systems for Hotels and Flats**

Various systems are manufactured specially for hotels and flats. These consist of switchboards or shutter boards incorporating a signalling device for each apartment Inter-phone, to enable the operator to know which room has called.

Inter-phones are also manufactured for use in conjunction with letter boxes in flats, etc., door opening devices, connection to tradesmen's entrance, caretaker's quarters, etc.

**SYSTEM NO. 12****Master Station, Common Talking****Service**

Consists of one centrally located "Master Station" Inter-phone to which are connected other "outlying station" Inter-phones. The system provides for communication from a central point to different stations and vice versa.

**Operation**

The Master Station Inter-phone is equipped with a number of push buttons; one for each outlying station in the system. By depressing the button marked with the name or number of the outlying station wanted, the bell at that station will ring and there only. The outlying stations are equipped with only one button, which will ring the Master Station when depressed. Only one conversation can be carried on at a time.

**Capacity**

One Master Station and from two to twenty-four outlying stations.

**Types of Interphones**

Wall, desk and handset Inter-phones may be used in this system for either the master or outlying stations.

**Battery**

One battery of three or four dry cells provides the current for talking and signalling. The batteries should be enclosed in a box and placed near the centre of the system in an inconspicuous but convenient and dry place, such as on a shelf or in a cupboard. Generally a set of batteries will last from nine to twelve months, and are cheap and easily replaced.



8-Button Master Set (Handset Type)



Outlying Wall Type Set

**MAGNETO TELEPHONE SYSTEMS**

The advantages of this system are the low initial cost of exchange equipment and the ability to operate successfully on long lines of which the insulation is not the best. The current for speaking is supplied by means of two or three dry cells located at each telephone, and ringing is effected by means of a hand magneto gene-

rator and ringer or bell, which are embodied in each instrument.

A variety of magneto switchboards and telephones are available for every purpose. Switchboards are available in sizes from five lines upwards.

(Continued on next page)

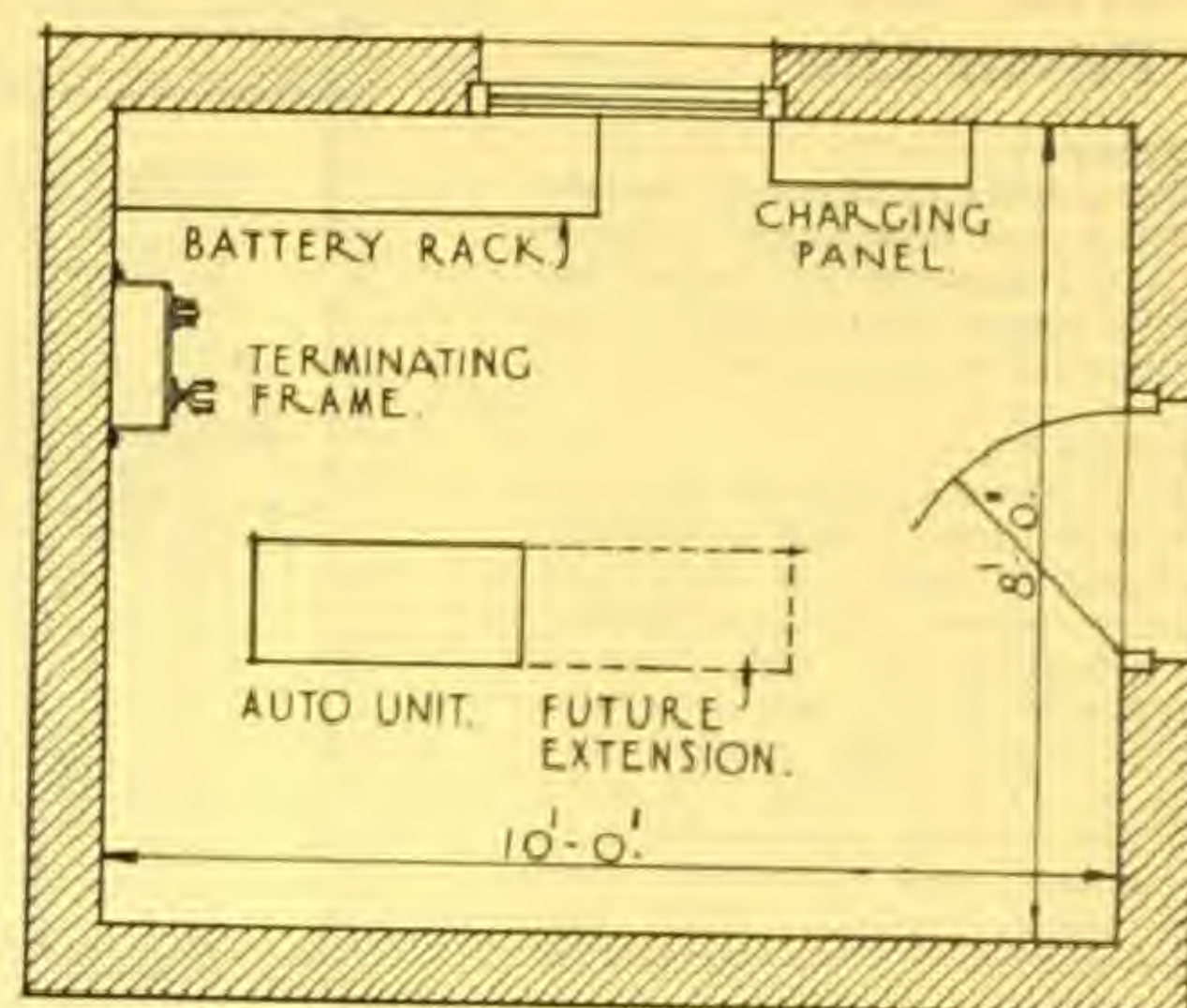


### Installation and Location

When selecting the location of the automatic unit, several points have to be considered. In the first place a position should be chosen, if circumstances permit, which will enable the wiring to be carried out in the most efficient and economical manner. In addition, a position should be found for the equipment where it will not be subjected to vibration, or to dust, smoke, damp, acid fumes, or other disturbing influences. It can be assumed that any room which is suitable for human habitation will be suitable for housing the automatic unit.

A suggested layout for the automatic unit terminating frame, power plant and batteries, is shown opposite.

The dimensions of each No. 7001 unit are 6 ft. high, 2 ft. 6 in. wide, and 1 ft. 3 in. deep. The battery rack usually consists of two shelves approximately 5 ft. long by 12 in. wide. The size of the terminating and arrester frame for a 35 line installation is approximately 2 ft. wide by 20 in. high. In view of the smallness of the No. 7010 unit, this can be conveniently mounted on a table or in a cabinet with the batteries, charging equipment, etc., in close proximity.



Layout of Automatic Unit

### TELETYPE — THE ELECTRIC MESSENGER

The Teletype is a telegraphic typewriter that transmits a type-written record over an ordinary telephone line, irrespective of distance. It is the latest and most efficient aid to the art of communication, and consists of a set of typebars similar to that of the typewriter. These typebars are mechanically thrown against a platen, thus causing a letter to be printed at both the home and distant end. The electrical equipment consists of five small selector magnets for actuating

the code bars, a sixth pulse magnet, which starts the operation of the printer, and a small motor which drives the mechanism.

The Teletype eliminates a great many of the errors and delays that occur in any business. It types its message on paper simultaneously on any number of machines at any distance. It can be used with, or as a substitute for, telephones, tubes and messengers; to speed up the execution of orders, and is of infinite

value where the factory or warehouse is situated some distance from the offices.

The Teletype is operated just like an ordinary typewriter, and is fast in operation—60 words per minute. It requires no one at the receiving end, but automatically taps out its messages, which are taken from the machine and acted on immediately. It produces a double check on every transaction—prints its message at both sending and receiving end.

### ARCHITECT'S SPECIFICATIONS — INTER-OFFICE TELEPHONES

#### EXTENT OF WORK

This contract covers the supply and installation, ready for service, of an inter-communicative service for the respective points set out as follows:..... (or, as indicated on drawings Nos. ....) and includes No. .... wall type and No. .... desk instruments, samples of which shall be submitted and approved of before the acceptance of the contract.

#### SERVICE REQUIRED

The service required to be performed by the instruments shall be:—

- a. Selective Ringing—Common Talking.
- or b. Selective Ringing—Selective Talking.
- or c. Master Station—Common Talking.
- or d. Two-Station Private Line.

#### INSTRUMENTS

The size of the instrument shall be to the nearest standard size that will cover the number of points required.

Instruments shall be of type calculated to withstand heavy and continuous traffic conditions. The name of each person called by such an instrument shall be neatly and clearly shown and secured by means of an approved holder. Wall sets shall be firmly secured in a workman-like manner, and, unless otherwise directed, fixed at a

height of 4 ft. 6 in. from the floor measurement to centre of instrument.

#### MATERIALS

Cables shall consist of multi-core metallic circuit; each wire being of high conductivity copper, enamelled and double cotton insulated; one wire of each pair shall be coloured for identification. The bunched conductors shall be taped and impregnated with wax and protected with an outer covering of lead (or braiding, if specified).

#### WORKMANSHIP

Cables shall be neatly installed and, where necessarily exposed, be as inconspicuous as possible. Where subject to injury, they shall be enclosed in approved conduit and painted to match the surroundings.

Junction boxes, of an approved type, and fitted with a suitable cover, shall be used when two or more cables are joined.

#### POWER UNIT

The complete system shall be operated by means of approved low amperage, low internal resistance dry cells enclosed in a suitable battery box, and placed in a convenient position where directed.

#### GUARANTEE — FREE MAINTENANCE

The work shall be carried out to the satisfaction of the Architect and guarantees of free maintenance shall be specified by the tenderer.



31 k

# THE AUSTRALIAN GENERAL ELECTRIC CO. LTD.

NEW SOUTH WALES — VICTORIA — SOUTH AUSTRALIA — QUEENSLAND  
WESTERN AUSTRALIA — TASMANIA

(For a complete list of branch offices, see page 384, 436 or 450)

S.A.A. File No.



## EDISON ELECTRIC COOKING AND BAKING EQUIPMENT

### Products

Edison Commercial Electric Cooking and Baking Equipment consists of a complete line of electrically-heated Bake and Roasting Ovens, Ranges, Broilers, Urns, Steam Tables, Stock and Fry Kettles, Griddles, Waffle Irons and Toasters.

### Edison Electric Commercial Cooking Equipment

The Edison Co. is the World's largest manufacturer of Commercial Electric Cooking and Baking Equipment. In thousands of hotels, restaurants,

Terminal of heavy non-corrosive material threaded into resistance wire.

Protective Metal Casing.

Solidified Magnesite electrical insulator and heat conductor.

Resistor of Calorite, finest grade of nickel chromium wire, made to Hotpoint specifications.

SECTIONAL VIEW OF CALROD.

hospitals, clubs and institutions this equipment is giving superior service.

This equipment is the result of fifteen years' experience. The patented Calrod Unit in Edison Ranges, etc., provides efficient, economical use of electricity in addition to the advantages of cleanliness, conservation of cooking space and flexibility. The Edison appliances illustrated on this page are now made in Australia.

### THE PATENTED CALROD HEATING ELEMENT

Architects and engineers, familiar with the problem of more rapid oxidation of element and terminals under high temperature operating conditions, with the problem of properly insulating and supporting resistance wire, of protecting it from possibility of physical damage, and knowing the higher utilisation efficiency of direct-contact heating, recognise the Calrod element as the ultimate achievement in electric heating efficiency and economy.

Vitrified Magnesite, when solidified, is both a perfect electrical insulator and an excellent conductor of heat. It is in no way affected by high temperature.

After the helical coil of Calorite has been suspended in the seamless steel tube, completely insulated and supported by packed, powdered Magnesite, the tube is swaged down, by a tremendous power, to a smaller diameter. The Magnesite is thus compressed as hard as granite, completely excluding all air and eliminating possibility of oxidation. Calrod then is in effect a solid rod, capable of being bent or shaped as required for any application.

Another rugged feature is the terminal construction. The Calorite resistance wire is threaded on to long heavy terminals of pure nickel well inside the protecting sheath. They extend a suitable distance out of the tube so that the connection can be made in a cool place, well removed from the high temperature zone. This does away with all possibility of terminal trouble.



Type AHC-D Edison Heavy Duty Range.  
DIMENSIONS.

**CAPACITY.** Overall—  
Capable of Height 31in., Depth 43in., Width 64½in.  
Catering Each Oven—  
for up to Height 13½in., Depth 26in., Width 19in.  
150 persons  
per meal.

**WATTAGE.**  
Four 4 K.W. Boiling Units.  
Two 3 K.W. Oven Units.  
Total—28 K.W.

### Kitchen Equipment Service

Our specialised experience will be helpful and profitable to you and your clients.

If you call on us we will gladly assist in the preliminary stages of planning Kitchen and Bakery installations. The flexibility and variety of our equipment enables us to assure satisfactory and economical service irrespective of the output required.

### Advantages of Edison Equipment

Edison Electric Cooking Equipment has the following advantages:—

(1) Simplicity—just the turn of a switch starts the heat; each switch indication assures the accurate amount of heat exactly as desired.

(2) Less floor space required—i.e., two Edison ranges are more than equivalent in total cooking capacity to three fuel type ranges of equal floor space. Likewise with Edison Baking and Cooking Ovens, one three-deck oven is the equivalent of three fuel ovens.

(3) Architectural advantages. This equipment can be located in any part of the building with less consideration given to ventilation, etc.

(4) Lower upkeep cost. There are no replacements of cooking tops—i.e., the first electrical cooking and baking equipment made by this company (20 years ago) is still in daily use. The patented CALROD heating element cast inside the solid iron hot-plates is forever sealed and protected against oxidation or physical damage.

(5) Better Cooking and Baking; Cleanliness; Coolness; Banished Fire Hazards.



Ad-A-Deck  
Heavy Duty  
Electric Bake Ovens.

Catalogue No.	Floor Space. Width. Depth. In Inches.	No. of 16 x 28in. Trays.	Kilowatts.
A.H.R.7	51 x 43	2	6.3
A.H.R.14	51 x 43	4	12.6
A.H.B.4	52 x 73	4	8.3
A.H.B.8	52 x 73	8	16.6



31k	<b>STATE ELECTRICITY COMMISSION OF VICTORIA</b>		<b>S E C  RANGES</b>
	HEAD OFFICE: 22 WILLIAM STREET, MELBOURNE		
	Metropolitan Electricity Supply Showrooms: 247 FLINDERS LANE, MELBOURNE	DISTRICT SHOWROOMS THROUGHOUT VICTORIA	

[For Other Products, See Pages 376, 410, 440]

## "MOFFAT" AUSTRALIAN-MADE ELECTRIC RANGES

### Cooking by Electricity

Electric cookery is different to any other method in that it is accurate and scientific, and not mere guesswork. This is the fundamental distinction, and it is the reason why the electric range is supplanting the fuel and gas stoves, just as in the last few decades the old kerosene lamp was displaced firstly by gas, which in turn gave way to electric light.

### Distinctive Features

**SIMPLICITY**—Switches are clearly marked, easy to operate, and definite in their contact. There is no such thing as "partly on"—the switch must be either on or off, whether the degree is "high," "medium," or "low."

**ECONOMY**—Space: No space is required for fuel bins, and even chimneys may be dispensed with in favour of a hood and flue. The saving in construction cost should pay for the range.



**MODEL E.41**

A compact range, especially suitable for the small family. Low in first cost, and exceedingly moderate in operating cost. Fitted with Moffat's new patented Pyrox elements. Boils on top, grills below. Porcelain enamel oven front, door, panel and hinges; high-grade black enamel finish elsewhere.

	Dimensions—Width.	Depth.	Height.
Bake Oven . . . . .	12	10½	11
Top . . . . .	19	14½	—
Extreme Dimensions . . . . .	19	15	16½

Combination Element on Top: 1,500 watts.

Bottom Oven Element: 900 watts.

**LABOUR**—No wood chopping or preparation of fires is necessary. Little attendance required; and there is a general saving in work due to the cleanliness of the range.

**OPERATION**—Costs vary in different areas, and in the Commission's districts low tariffs are available for both domestic and commercial cooking. This permits definite savings over other methods. In addition, the heat used is not dissipated, but is retained in the air-tight oven, which thus attains a high efficiency.

**CONVENIENCE**—No seeking for wood or matches, no adjusting jets or fires, and no peering into hot ovens is required. A snap of the switch operates the stove; the thermometer registers the degree of heat inside the oven; turning and basting is unnecessary, and heat losses thereby minimised.

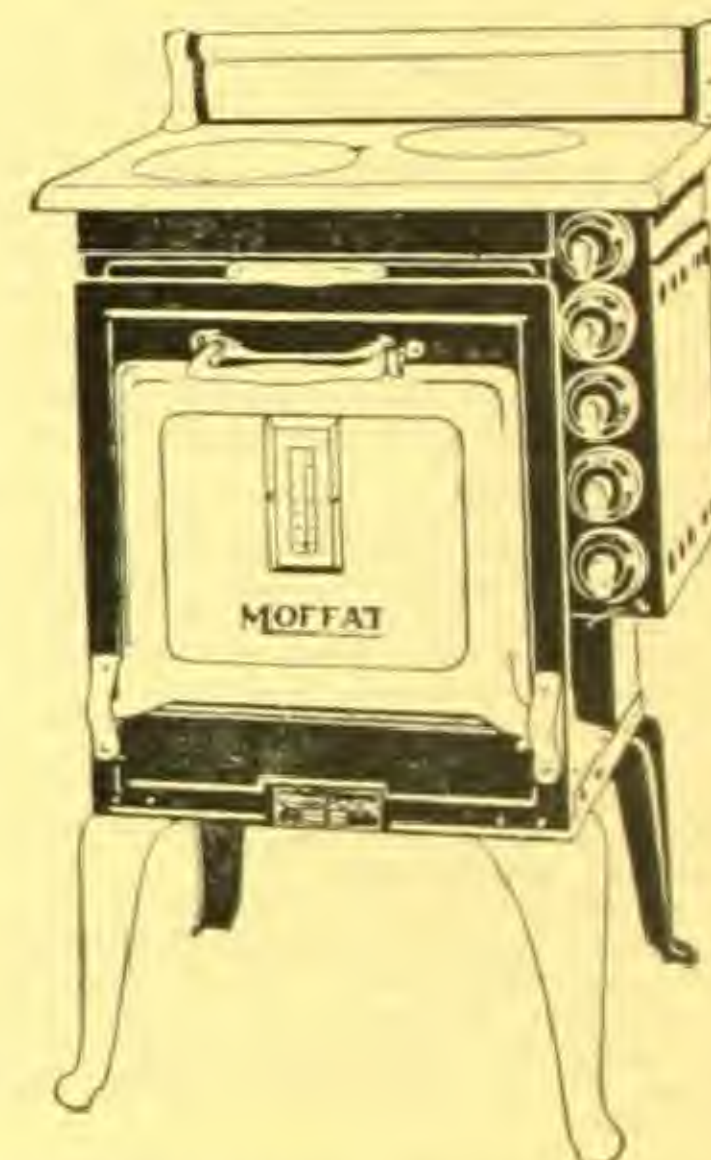
**ACCURACY**—The heat is capable of exact determination and regulation, and consequently successful results can be repeated from day to day.

**CLEANLINESS**—There is no soot, smoke, ashes or other products of combustion to be disposed of, no burners to be cleaned, and the interior decorations of the kitchen, etc., remain in a clean condition. The enamel finish makes cleaning of any spill-overs easy and effective.

**RELIABILITY**—Electric cooking apparatus is designed for lifetime service, and its maintenance cost is low. Parts are easily replaceable.

With an electric range the cooking is literally done "to a degree," i.e., the heat is indicated on the outside thermometer, and when the required temperature is reached, the switches are adjusted accordingly. There is no guessing the degree of heat, no peering into a hot oven, thereby "cooking the cook," and spoiling the food, but simply an accurate measurement and registration of a required heating intensity.

**SAFETY**—Fire and explosion and gas poisoning risks are banished. Electric ranges are thoroughly safe to use, and in this respect surpass any other cooking stove.



**MODEL E.28**

An excellent range for the small apartment, or where the cooking demand is for three or four persons. White and ivory enamel oven front, top, door panel, hinges and front legs.

	Dimensions—Width.	Depth.	Height.
Oven . . . . .	14	13½	12
Top . . . . .	23½	16½	—
Floor to Top . . . . .	—	—	36
Extreme Dimensions . . . . .	23½	19½	40

Elements on Top: One 1,700, one 930 watts.

Elements in Oven: Two 1,000 watts each.

**COMFORT**—Almost all the available heat is used in the cooking operation, and a minimum amount only dissipated in the room; consequently the operation is cool and comfortable.

**BEAUTY**—Handsome in design and beautifully finished in enamel, an electric range is an attractive addition to any kitchen.

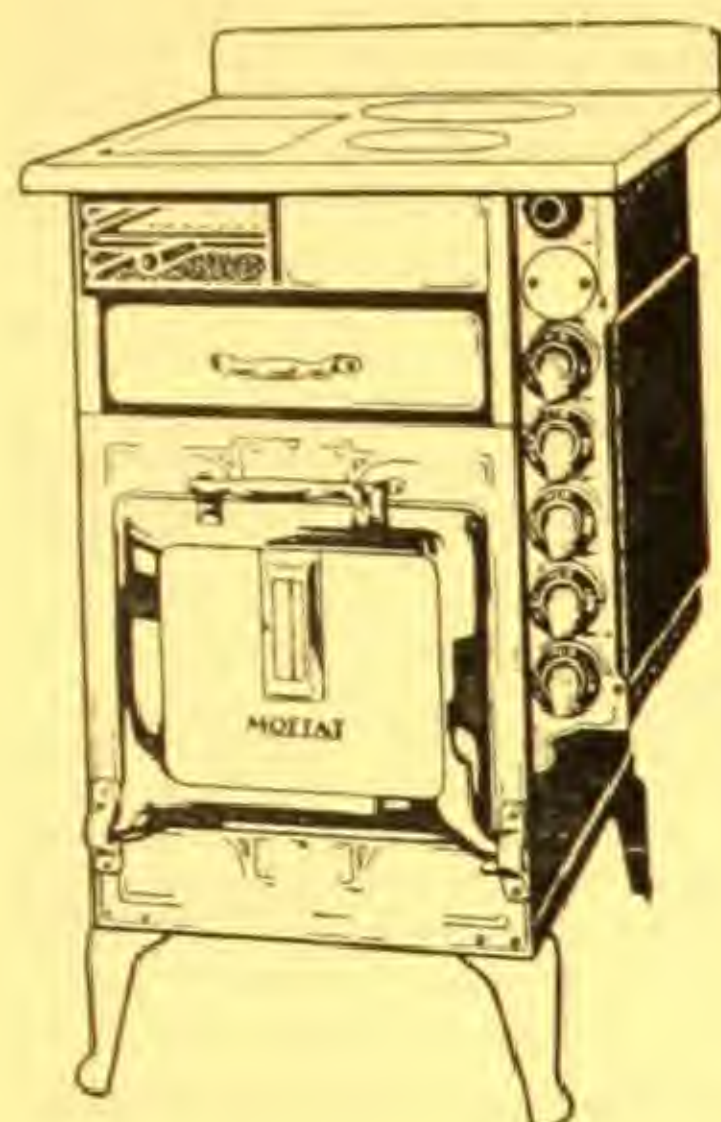
### Other Models and Accessories

In addition to the models shown in this catalogue, the following are available:—

- E42—Similar to E41, but smaller. Two hot-plates.
- E37—Similar to E28, but larger. Three hot-plates.
- E38—Largest low-oven type. Four hot-plates.
- E36—Largest cabinet type. Four hot-plates.

(Continued on next page.)



**MODEL E.43**

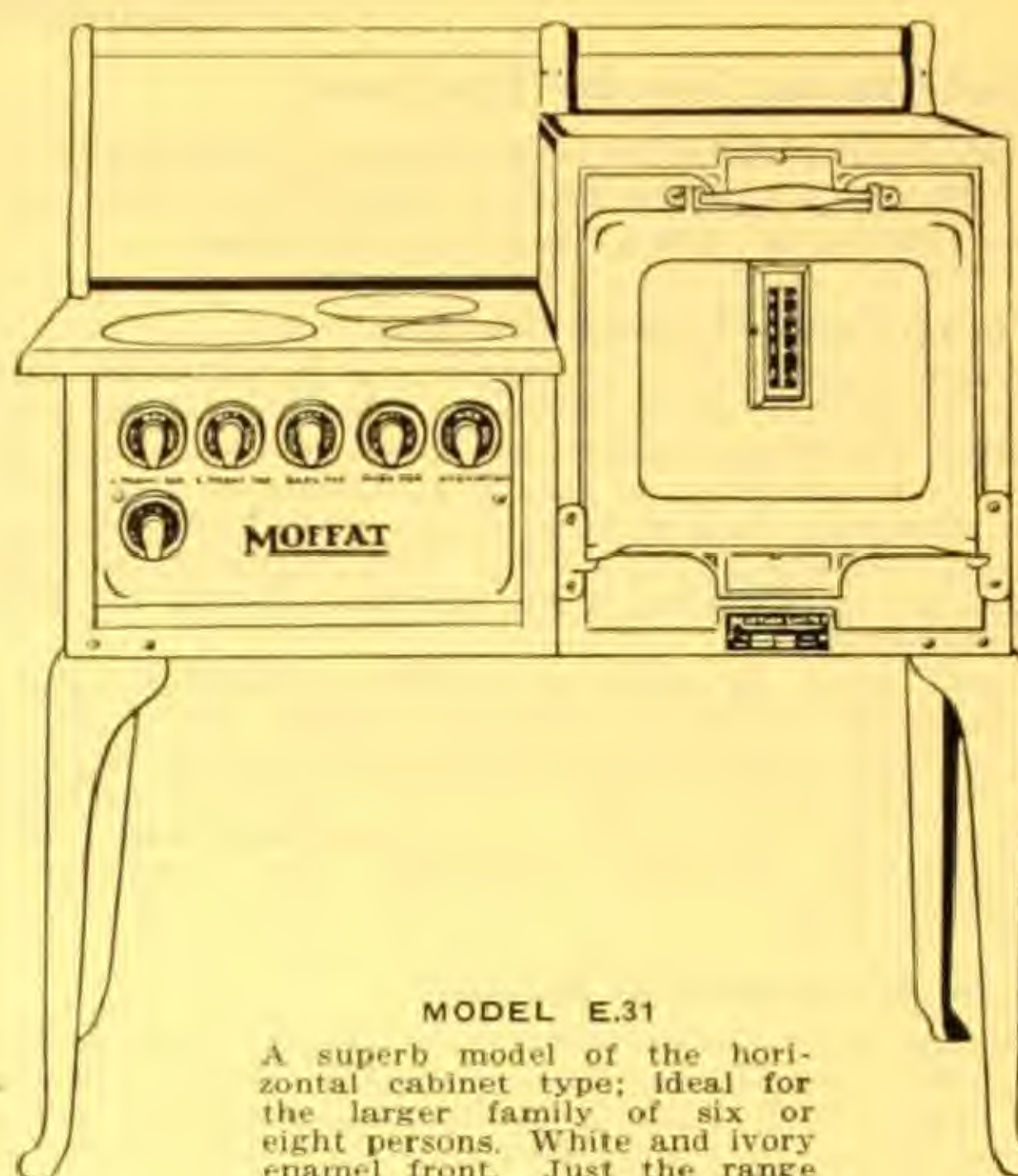
A superb range with a high-quality finish. The outside grill is the outstanding feature. Pancakes and scones can be baked on top while grilling is being done below. The model is equipped with dish-warming compartment. White and ivory enamel finish to front and top; sides finished high-grade black enamel.

Dimensions—Width. Depth. Height.

Bake Oven	14	18	12
Grill Oven	8	11½	3½
Dish-Warming Drawer	15½	20	4½
Top	24	22½	—
Top to Floor	—	—	36½
Extreme Dimensions	24	25½	39½

Elements on Top: One 1,700 watts; one 660 watts; one grill element, 1,260 watts.

Elements in Oven: Two 1,260 watts each.

**MODEL E.31**

A superb model of the horizontal cabinet type; ideal for the larger family of six or eight persons. White and ivory enamel front. Just the range for the average-sized kitchen.

Dimensions—Width. Depth. Height.

Bake Oven	14	18	12
Top	21	22½	—
From Floor to Top	—	—	33
Extreme Dimensions	39	25½	45½

Elements on Top: One 1,700, one 990 and one 660 watts.

Elements in Oven: Top, 1,500 watts; Bottom, 1,260 watts.

The following accessories and refinements are also available:—

High backs for all low-oven types.

Legs and stand for E41 types.

Floor trays—all models.

Power points suitable for connection of jugs, kettles, and

other appliances are fitted to all models excepting E41.

Coloured mottled enamel effects.

## Prices

Having entered into a large contract with the manufacturers, the Commission is able to market the range at a low rate. Current prices range from £11/15/- upwards. Liberal hire-purchase terms, extending over a number of years, are available to consumers.

## Installation

The E41 model may be plugged into a 15-amp. power-point, but larger models require special wiring.

## Servicing

Ranges sold by the Commission are guaranteed for twelve months against electrical failure, and after that are subject to a service policy covering replacement of any necessary spare part at the cost of such part only—labour being provided free.

## Australian-Made

The State Electricity Commission of Victoria holds a licence from Moffats Ltd., Canada, the largest manufacturers of electric ranges in the British Empire, for the manufacture of "Moffat" ranges in Victoria, and has arranged accordingly with Metters K.F.B. Pty. Ltd., Melbourne.

## Apartment House Installations

Although no special models are made for flats and apartment homes, there is no great difficulty in adapting existing models for such purpose. For instance, the legs are detachable and structure of the stove is such that readily permits its being built-in to any desired position.

## Installation Data

The total connected wattage of the various types, excluding plug connection, is as follows:—

Model No.	Total Connected Watts	Total Current (amps.) at 230 volts	Total Current (amps.) at 200 volts
E 28	4690	21	24
E 31	6110	27	31
E 36	7280	32	37
E 38	7610	33	38
E 42	5180	23	26
E 43	6140	27	31

(Continued on next page.)



## LAUNDRY APPLIANCES

## Labour Saving Laundry Equipment

The major labour-saving electrical appliances for laundry use consist of washers, hydro-extractors, drying cabinets or rooms, ironers and presses.

## Washers and Hydro-Extractors

Washers are built in all sizes, from domestic machines with a capacity of 15 shirts per batch to large commercial machines capable of handling 350 shirts per batch. All washers can handle all classes of goods from silk stockings and fancywork to sheets and blankets without damage to the goods. The machines carry out efficiently the breaking down, washing, rinsing and blueing operations.

Some types of domestic washing machines have a motor-driven wringer, while in others the water is removed from the clothes by centrifugal action, either in the washing basket itself, or in a separate extractor integral with the machine. In commercial installations a separately mounted centrifugal type extractor is invariably used.

## Drying Cabinets and Rooms

Clothes drying in private houses and small commercial establishments can be taken care of by drying cabinets. For large commercial premises and laundries, special drying rooms or compartments, with forced ventilation where necessary, can be provided. Automatic temperature control can be provided where desired. The great advantage of drying cabinets and rooms is the independence of weather conditions, thus ensuring delivery of goods on time.

## Ironers

Ironing machines are available to cater for any ironing operation, whether flat work, such as sheets and table cloths, general work, such as soft shirts and frocks, or special work, such as evening shirts and stiff collars. Ironers range from small domestic sizes to large commercial machines with multiple rolls. The ironers are both electrically driven and heated.

## Domestic Installations

A domestic laundry to be complete would require a washing machine, ironing machine, and hand iron, and also, if independence of weather conditions were desired, a drying cabinet.

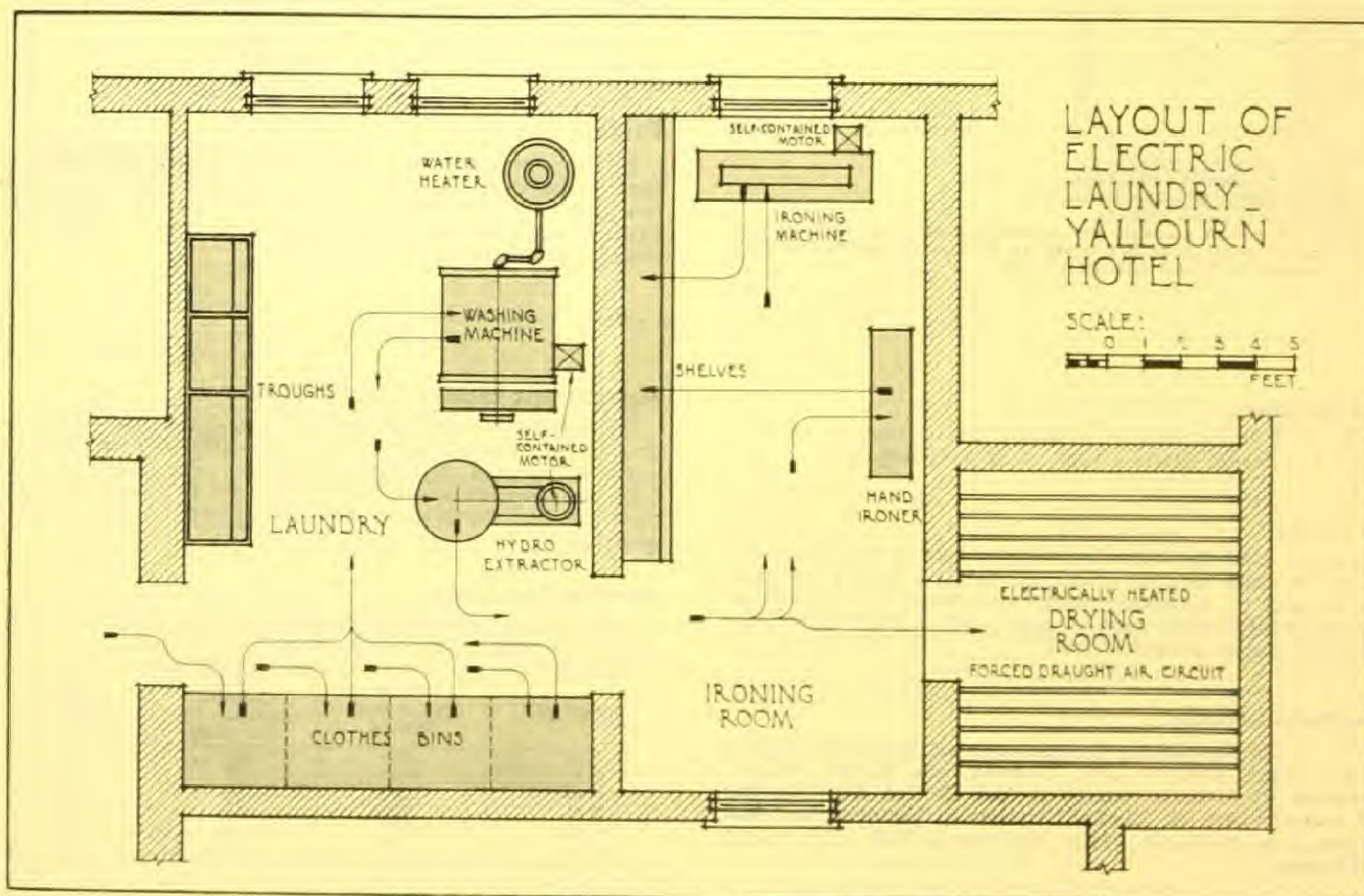
## Commercial Installations

A washing machine, hydro-extractor, drying room, ironing machine and hand iron would be required for a commercial installation. A great advantage of electrical equipment is that the driving motors are integral with the machines, thereby avoiding countershafts and belts.

## Wiring Notes

The main points to ensure regarding wiring and equipment are:—

1. That three or four pin power points are used.
2. That heating elements are provided with thermostats to automatically switch them off when a safe temperature is attained, and with pilot lamps to indicate when they are switched on.



(The drawings on this and the opposite page were drawn by the Architectural Staff of Ramsay's Catalogue.)

(Continued on next page.)



## COMMERCIAL ELECTRIC COOKING

## General

The advantages of cooking by electricity over other methods in the way of simplicity, economy, convenience, accuracy, cleanliness, serviceability, safety, comfort, etc., are fully set out on page 430 (domestic ranges). Brief mention may here be made, however, to two further points:—

- The ability to maintain throughout any cooking and baking operation a definite heat by automatic thermostat control.
- The absence of products of combustion and heated fumes. A simple ventilation system to remove cooking steam, etc., is all that is required, thus giving greater freedom in the location of the kitchen.

## Application

The field for commercial electric cooking consists of hotels, restaurants, hospitals, institutions, clubs, boarding schools, bakeries, etc. Examples in Melbourne are Buckley & Nunn Ltd., Myer Emporium Ltd., Georges Pty. Ltd., Royal Automobile Club, Scotch College, Church of England Girls' Grammar School, South Yarra, the "Argus" office, the Commonwealth Bank, etc.

## Equipment Available

A wide range of equipment in various sizes is available, including toasters, griddles, waffle irons, egg boilers, plate warmers, food warmers, urns, pastry ovens, pie ovens, roasting ovens, heavy duty cooking ranges, cooking tops, broilers, fish fryers, stock pots, steam tables, bain's marie, baking ovens, etc. It can be seen from the above that electric equipment is available for every kind of cooking operation. Each installation, however, requires separate consideration to determine which items, and what size equipment, should be used.

## Kitchen Layout

The plan of the all-electric kitchen at Yallourn Hotel is set out on this page as being indicative of what a modern hotel kitchen should be. Full particulars of the equipment in this and other hotel installations are available from the Electricity Sales Branch of the State Electricity Commission.

## Service to Architects

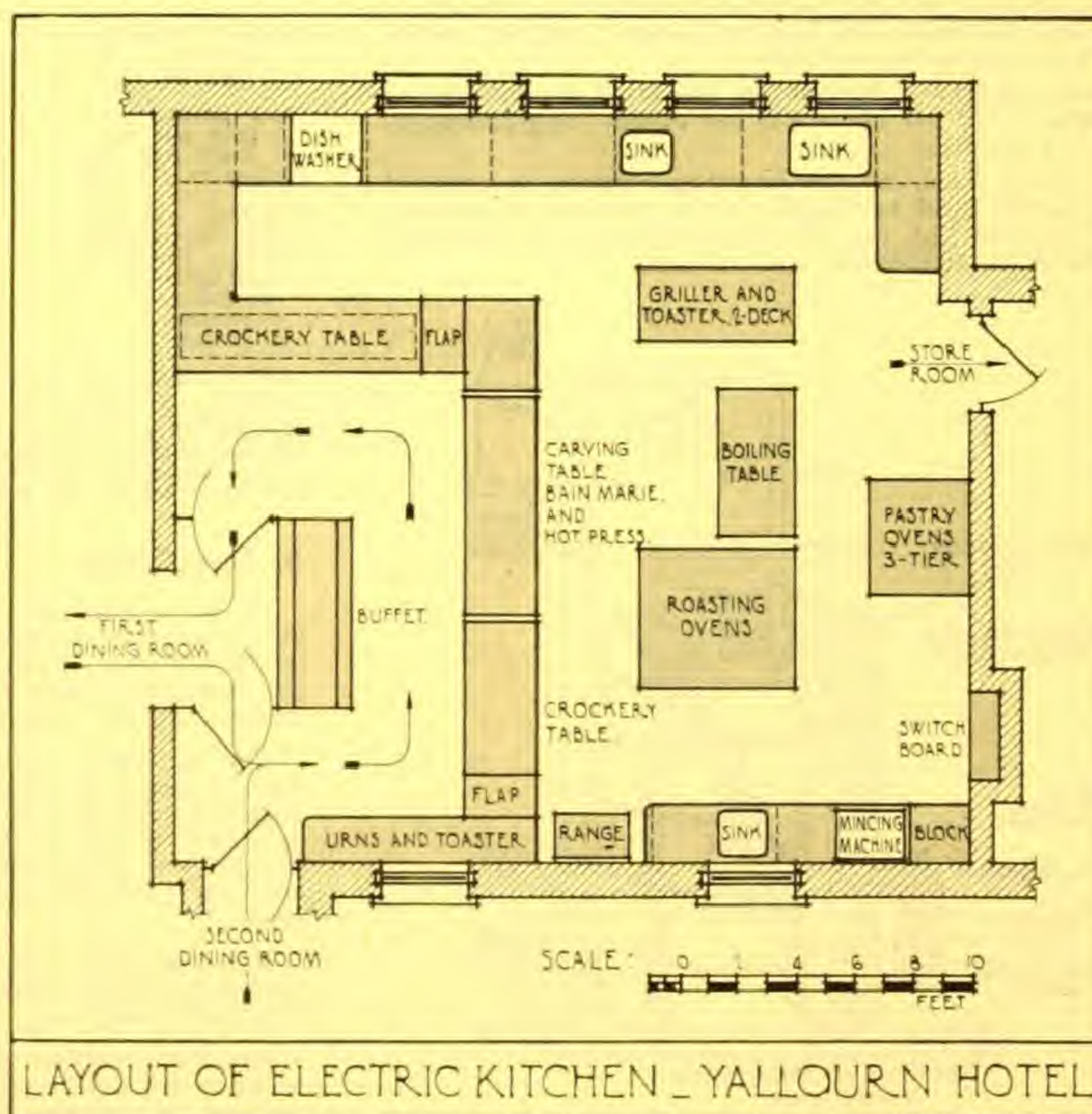
The Commission's technical staff are available at all times in an advisory capacity, and Architects are invited to freely avail themselves of this service.

## Costs

The remarkable flexibility of the Electric Range in coping with sudden peak rushes enables material savings to be made both in operation and food costs. The electricity consumption per person per meal varies with the kind and variety of food to be served and the electricity rates available. Generally it ranges from 0.25 units in the case of institutions and schools where a definite menu is prepared for all persons, up to 1.0 units for restaurants, where a variety of different orders are required quickly. For cafeterias, clubs and hotels, the figure would range from 0.35 to 0.75 units per person per meal, depending on conditions. In estimating electricity consumption, therefore, each case must be considered on its merits. The above figures show that, with the tariffs for electricity prevailing in Melbourne, costs as low as 0.5d. to 0.75d. per person per meal can be achieved in many cases.

For bread baking approximately 9 units are required per 100 lbs. bread. Rates for electricity vary, but most districts have a low restricted hour rate which permits the use of current between 11 p.m. and 7 a.m. at specially reduced rates. A most important factor in favour of the electric bake oven is the saving in dough, which is usually in the neighbourhood of 6d. per bag of flour.

On the side of capital expenditure, which should not be lost of the saving in ground space which is possible in the case of an electrical installation.



(Continued on next page)



## ELECTRIC HOT WATER SYSTEMS

## 1. General Description

There are two main types of systems:—

1. Central storage systems, where hot water is delivered from a centrally-located hot-water cylinder of 20 gallons upwards in size to bathrooms, kitchen, laundry, etc.
2. Isolated systems for installing immediately adjacent to a particular point of use, such as bath heaters, kitchen heaters, surgery heaters, etc. The hot-water cylinder sizes in these cases are usually 5 gallons for surgeries, 5 to 10 gallons for kitchens, and 10 gallons or over for bath heaters.

The normal demand for hot water is met by an electric heating element which is continuously connected to the electricity mains. To enable abnormal demands for hot water to be met, an additional or boosting element can be provided, and such element can either be switched on and off by hand as required, or arranged to operate automatically under thermostat control.

The hot-water cylinder, which is made of hard, rolled copper, is heavily insulated against heat losses, and is enclosed where necessary in a suitably finished metal container.

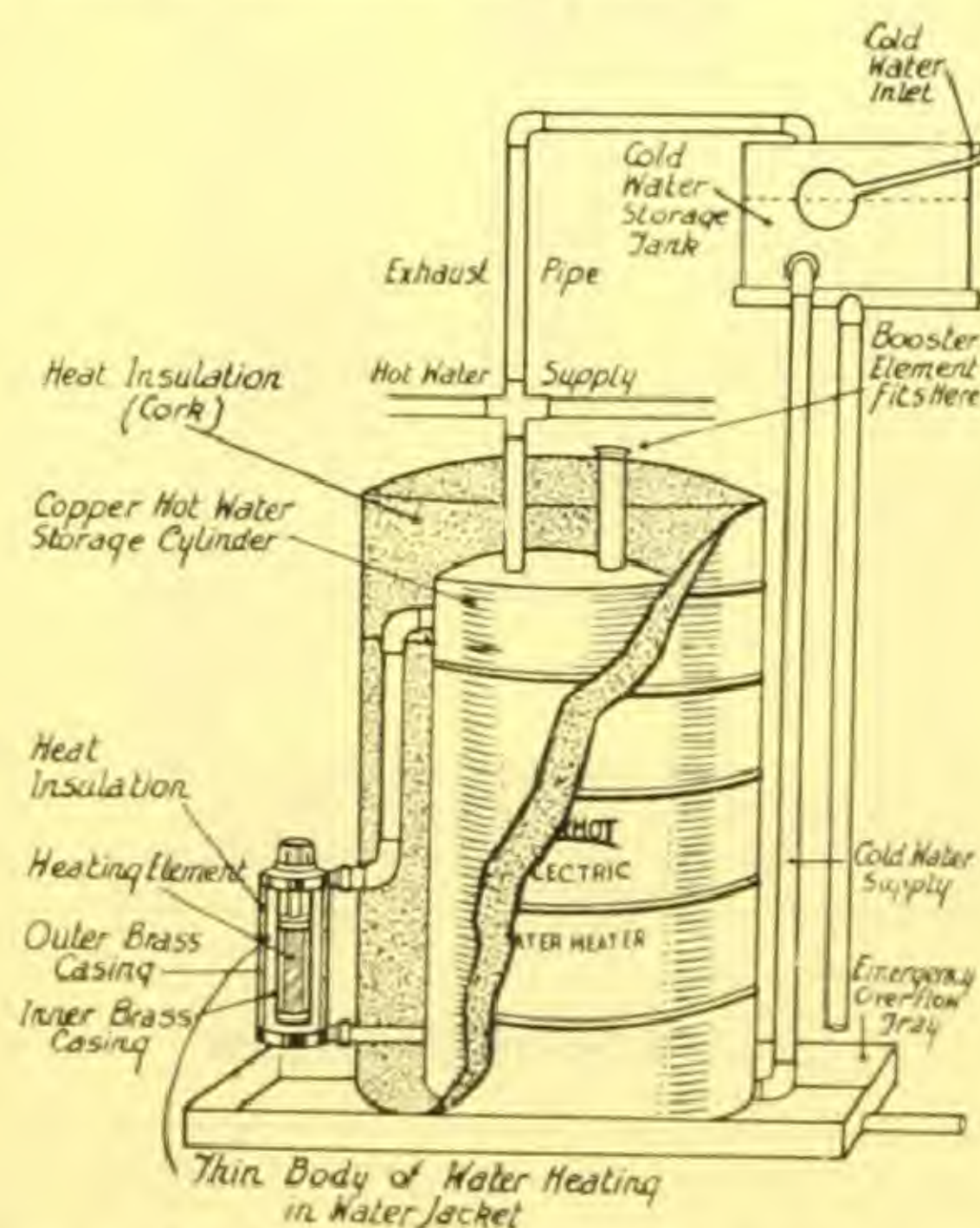
## 2. Technical Data

The water-heating capacity of a continuous element is approximately 7 gallons of water per 24 hours from 60 deg. F. to 160 deg. F. per 100 watts of element capacity. Boosting elements will heat about 3 gallons of water from 60 deg. F. to 160 deg. F. per hour for every 1,000 watts of their capacity.

The quantity of hot water delivered by a system is dependent on the size of heating element, and not on the size of the hot-water cylinder.

In the suburbs of Melbourne, the tariff for continuous elements is 3/9 per 100 watts per month (approximately 0.615d. per unit).

Electricity used by the boosting element is charged for at power tariff applicable to the premises concerned. This would be 1½d. per kWh. for residences on the two-part tariff in Melbourne and suburbs.



"Everhot" Electric Hot Water System.

## 3. Advantages of Electric Systems

**Convenience.**—Supply of hot water always available; no attention necessary for fires, etc.

**Cleanliness.**—No dirt, smoke or fumes given off; no ashes requiring removal.

**Safety.**—Absolutely safe and fool-proof; risks of fire and explosion eliminated.

**Appearance.**—Special vents or unsightly flues unnecessary; storage tank usually installed out of sight (in roof).

**Performance.**—Silent in operation; dependable for every day in the year; maintenance negligible; low running costs.

## 4. Recommended Sizes for Specific Purposes

An analysis of hot water requirements should be made in each individual case before installing a system owing to the great variations in the use of hot water in premises and households apparently similar. The following table may, however, serve as a guide:—

Purpose.	Size of Hot Water Storage Cylinder, Gallons.	Size of Continuous Element, Watts.	Gallons of Hot Water per Day at approx. 160 deg. F.	Approx. Cost per Day for Continuous Element.
Surgery . . . . .	5	100	6	1.5d.
Kitchen Heaters—				
3 persons . . . .	5	100	6	1.5d.
6 persons . . . .	10	200	13	3.0d.
Bath Heater—				
1 bath per day . .	10	200	13	3.0d.
1 bath and two showers per day	20	300	21	4.5d.
*Central Storage Systems supplying Bathroom and Kitchen—				
3-4 persons . . . .	30	400	28	6.0d.
5 persons . . . .	40	500	35	7.5d.
6 persons . . . .	50	600	43	9.0d.

\*Where a central storage system is used to supply the laundry as well as the bathroom and kitchen, the hot water cylinder should be 10 gallons larger than indicated in the above table. Some use of the boosting element would be necessary to meet washing day requirements.

## 5. Installation

In large premises, such as hotels, large residences, etc., it is often necessary to segregate the hot-water outlets into groups of adjacent outlets, and provide a system for each group, thus obviating long lengths of hot-water piping, and the consequent heat losses.

The hot-water cylinder of a central storage system may generally be located in the roof, under the floor, in a special cupboard, or adjacent to the outside wall of the premises, so long as the cold-water storage tank is above the highest hot-water outlet. With some makes, the hot-water cylinder must also be above the hot-water taps.

The hot-water cylinder of a central storage system should be located near the point where hot water is most frequently used, e.g., the kitchen sink.

Hot-water piping should be as small as possible in order to minimise heat losses, and ½-inch piping is recommended for general use. Piping smaller than ½-inch should not, however, be used.



## SECTION O

[Containing S.A.A. Filing Section No. 32]

## REFRIGERATION





# THE AUSTRALIAN GENERAL ELECTRIC Co. LTD.

32c

S.A.A. File No.

N.S.W.—The Australian General Electric Co. Ltd., 95 Clarence Street, Sydney; and at Keen Street, Lismore; 53 King Street, Newcastle.

VICTORIA—The Australian General Electric Co. Ltd., 108 Queen Street, Melbourne; and at Dean Street, Albury; 197 Whitehorse Road, Box Hill; Murray Street, Colac; Johnson Street, Maffra.

S.A.—The Australian General Electric Co. Ltd., 27 Grenfell Street, Adelaide.

QUEENSLAND—The Australian General Electric Co. Ltd., cr. Queen and Adelaide Streets (Petrie's Bight), Brisbane; and at 158 East Street, Rockhampton; Flinders Street East, Townsville.

W.A.—Agents:—Messrs. Atkins (W.A.) Ltd., 894 Hay Street, Perth.

TASMANIA—Agents:—Messrs. Oliver and Oliver Pty. Ltd., 9 Argyle Street, Hobart; and at Quadrant, Launceston.



[For Other Products, See Pages 384, 429 and 450]

## Product

General Electric All-steel Refrigerator—for homes, apartments, clubs, restaurants, shops, institutions and hospitals.

## Design

Designed to (1) occupy little space, (2) eliminate exposed moving parts, (3) require no attention, not even oiling, (4) eliminate servicing to a minimum, (5) provide constant refrigerating temperatures automatically and at low cost, (6) reduce the possibility of gas leaks, and other causes of failure to a minimum.

## General Advantages

In specifying G.E. All-steel Refrigerators, the architect has the assurance that he is specifying an electrical product that will give outstanding, continuous satisfaction. He eliminates the need of any unnecessary work, for no plumbing or extra wiring is required.

The icing unit is one of the simplest yet devised; the compactness of the evaporator gives more room for actual food storage.

## Operation of the G.E. Icing Unit

For the purpose of explanation, the General Electric Icing Unit can be divided into four major parts:

### (1) The Freezing Chamber.

Sometimes called the evaporator or chilling unit. This is inside the cabinet.

### (2) The Compressor.

Which is inside of the hermetically sealed casing, and that compresses the gas after it evaporates.

### (3) The Condensing Coils.

After the Refrigerant vaporises in the freezing chamber, it is compressed and passed into the condensing coils, where it is cooled and returned to liquid form ready to commence another cycle.

### (4) The Control.

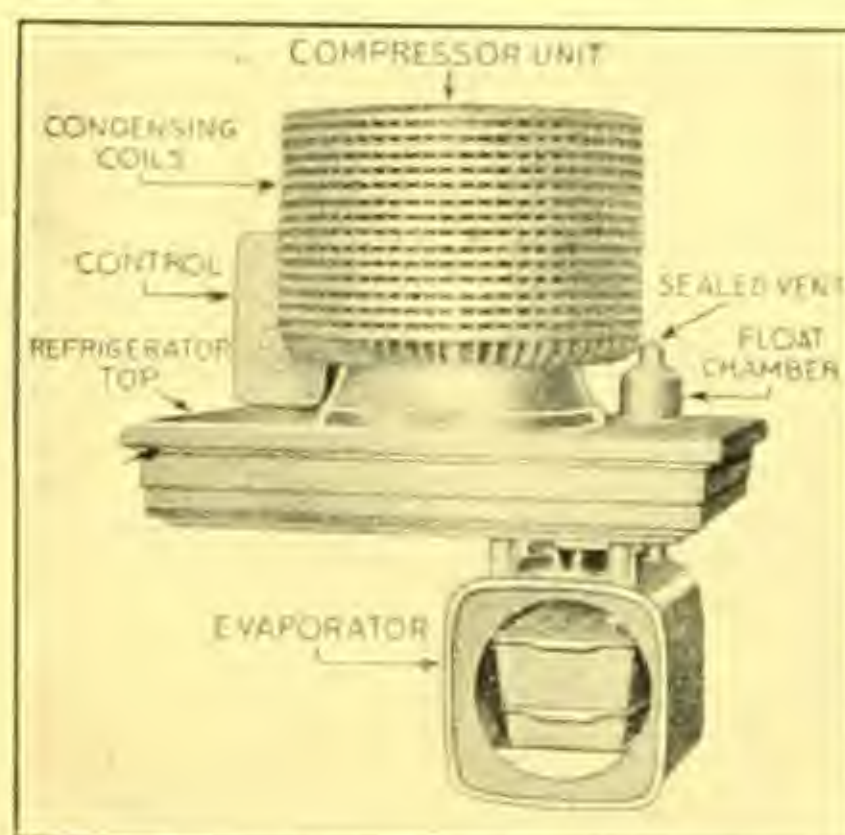
This automatically regulates the operation of the machine and is so perfected that it provides an even temperature inside the cabinet.

The range in temperature in the evaporator is from 14 degrees to about 28 degrees F.

The above system of generating cold is probably the simplest and most trouble-free that has been devised for the home.



Model G55—5½ c.ft. Capacity.



The whole unit can be simply raised out of the cabinet and replaced with a new one in the event of an emergency.

There is no exposed machinery—it is all contained in an hermetically sealed steel casing mounted on the top, up and away from floor dirt. The circulation of air through the coils prevents dust from settling on the top.

The corners of the interior of the cabinets are rounded to make cleaning an easy task. All of the models are mounted on legs to permit cleaning of the floor under-

Table (Capacities—Dimensions)

Model	Food Storage Capacity.	Food Shelf Area.	Floor Space Required.	Height.	Motor H.P.
G. 40	3½ cu. ft.	6½ sq. ft.	24½ in. x 21½ in.	5ft. 4in.	1/10 H.P.
G. 55	5½ cu. ft.	9½ sq. ft.	28½ in. x 22½ in.	5ft. 6½ in.	1/8 H.P.
G. 75	7½ cu. ft.	12½ sq. ft.	34½ in. x 25½ in.	5ft. 7½ in.	1/8 H.P.
PRL 95	10 cu. ft.	18½ sq. ft.	41½ in. x 25 in.	5ft. 8½ in.	1/6 H.P.
G. 100	10 cu. ft.	18 sq. ft.	44½ in. x 23½ in.	5ft. 5in.	1/6 H.P.
PL 13	13 cu. ft.	20 sq. ft.	48 in. x 24½ in.	5ft. 11in.	1/6 H.P.
PL 17	17 cu. ft.	25 sq. ft.	61½ in. x 24½ in.	5ft. 11in.	1/6 H.P.

neath. The General Electric All-steel Refrigerator operates so quietly that it can hardly be heard, and the cold loss has been reduced to the minimum. It is guaranteed against defective materials and workmanship for three years.

## Other Models

Large models up to 60 cub. ft. capacity are available where food can be kept in quantity.



# THE DOMESTIC ENGINEERS' & PLUMBERS' SUPPLIES CO. PTY. LTD.

Copeland  
Dependable  
Refrigeration

365 LATROBE STREET, MELBOURNE, VICTORIA

SUPPLIERS OF  
COPELAND DEPENDABLE REFRIGERATION

32c

S.A.A. File No.

[For Other Products, See Page 330]

## Products

Domestic and Commercial Automatic Electric Refrigerators, comprising a full range of models for both self-contained and remote installation.

## Features

Copeland Automatic Electric Refrigerators provide refrigeration which is convenient, economical and dependable.

(1) All models are equipped with automatic temperature controls which can be set to give and maintain the constant temperature necessary for proper food preservation.

(2) The operation of the refrigerator is silent and most economical, as all domestic Copelands use 1/6th H.P. motors, which materially reduces electric current consumption.

(3) The freezing of large quantities of ice cubes is quickly accomplished—from 90 to 390 clear crystal cubes at one freezing.

(4) The mechanism is completely concealed in handsomely-proportioned and finished cabinets containing ample food storage space and shelf area specially designed to eliminate bending over when reaching for foodstuffs.

(5) Unnecessary plumbing in the shape of drain pipes is avoided by the use of defrosting receivers.

(6) No special location is required: the self-contained model is delivered ready for plugging in the attached cord to any convenient power point.

(7) When once installed, the architect has the assurance that Copeland Refrigeration will give the owner years of continuous and satisfactory service.

## Cabinets

Cabinets are available in all porcelain, or with porcelain interior and exteriors of Duco, polished blackwood or oak. All cabinets are constructed from the finest materials of their class and are thoroughly insulated with cork slabs, wrapped in a non-conductive building paper. Extra heavy nickel-plated automatic hardware of pleasing designs adds to their appearance. The cabinets have deep trays for freezing desserts, and a cold tray for chilling salads, storing ice cubes, etc.

## Sizes

Domestic Copelands are available in self-contained models with food storage capacities of 5½, 7, 9 and 14 cubic ft., and in Remote models with capacities of 14, 20, 24, 28 and 30 cubic ft.

### Self-Contained Models—

Model No.	Overall Dimensions in			Ice Trays	Food Storage Capacity	Doors
	High	Wide	Deep			
A 5	55½	24½	22½	3	5½	1
A 7	64	32	24	3	7	1
N 9	65½	35	22½	4	9	1
CS 14-22	70	45	26	7	14	4
Remote Models—						
Made with dimensions to Architect's specifications					14	4
					20	4
					24	6
					28	6
					30	6

Commercial models available with storage capacities up to 150 cub. ft.

## Operation

Refrigeration is obtained by compressing the refrigerant and changing it from a liquid to a gaseous state. When in this gaseous condition it absorbs the heat from the interior of the cabinet and carries it along with the gas into the condenser. Here it is cooled and condensed back into a liquid, and during the condensation the heat is thrown off into the surrounding atmosphere. This cycle is again repeated, the frequency of the action being governed by a thermostatic control which automatically starts and stops the motor as the predetermined high and low temperature limits are respectively reached.

## Compressor

The compressor is of the reciprocating type and is fitted with latest type head with disc valves.

## Condenser

The condenser is made from the highest grade seamless copper tubing and is fitted with fins to give greater cooling and quicker condensation.

## Cooling Tank

The cooling tank is of high-grade copper, tinned on the outside and fitted with ice trays.

## Refrigerant

The refrigerant is Iso-Butane, which is harmless, odourless and non-corrosive.

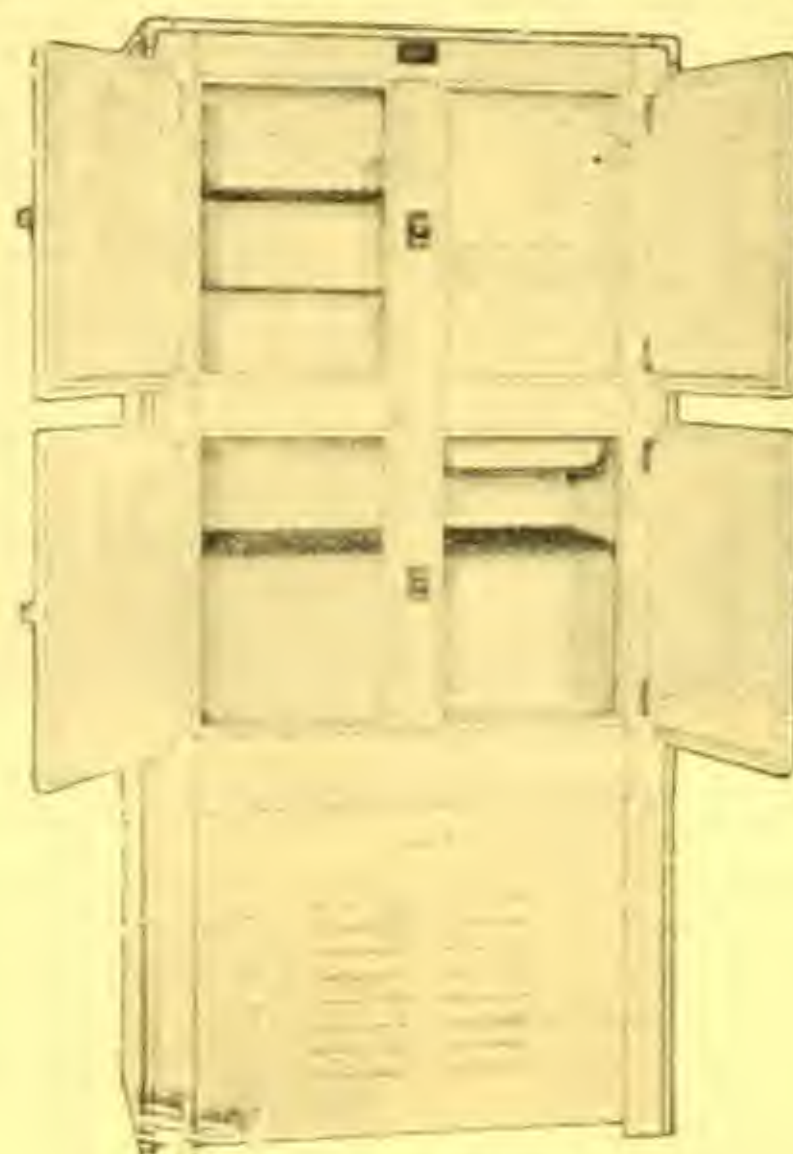
## Remote Control

Refrigeration can either be effected by self-contained installations, in which the compressor is in the base of the cabinet, or by remote control installations, in which the compressor is placed in the basement or some other remote location and numerous cabinets refrigerated from the one central unit. The latter system, owing to its low initial and operating expenses, is recommended for use in apartment-houses, etc., where a series of cabinets are to be installed.

Both remote-controlled and self-contained cabinets can be used in connection with a remote-controlled installation. The compartments at the bottom of the cabinet, ordinarily used to accommodate the compressor, may be used as a vegetable storage cabinet.

## Installation

Copeland self-contained Domestic models are delivered ready to plug in to any ordinary electric power point. In the preparation and planning of a remote-controlled installation, the architect is invited to avail himself of the services offered by the Domestic Engineers' and Plumbers' Supplies Co. Pty. Ltd., who will tender advice and suggestions regarding the necessary electric service, the capacity of the compressor for operating a given number of cabinets, the setting out of refrigerant lines, and any other information necessary for the complete installation of Copeland Dependable Electric Refrigeration.



14/22 Model.  
All Porcelain Cabinet.



Domestic Model Compressor.



32c

S.A.A. File No.

## NEW SYSTEM TELEPHONES PTY. LTD.

181-183 KING STREET  
MELBOURNE.  
Tel. M 3191.280 CASTLEREAGH STREET  
SYDNEY.  
Tel. M 6425.22 PULTENEY STREET  
ADELAIDE.  
Tel. C. 6676

ElectrICE

Works: Hollingsworth Works, West Dulwich, London.

[For Further Information on ElectrICE, See Pages 440 to 443]

## A PRODUCT OF AUSTRALIA

ELECTRICE FULL AUTOMATIC DOMESTIC AND COMMERCIAL  
ELECTRICAL REFRIGERATORS

The benefits to health and pocket which accrue from the use of a Refrigerator are common knowledge nowadays, but it is not so generally known that the Refrigerator which is best suited for service in Australia is actually manufactured here by an Australian Company.

Made by Electricity Meter Manufacturing Co. Ltd., of Waterloo, Sydney, ElectrICE Refrigerators are the equal of the world's best. Furthermore, ElectrICE provides a

more efficient service than the imported article, and sets a new and higher standard of refrigeration than has hitherto been known in Australia, because it is specially constructed to withstand Australian climatic conditions, an advantage compared with imported machines, which naturally, are made primarily to operate efficiently in their own home markets. Each ElectrICE model is tested to an extreme heat of 115 degrees.

The Home  
of  
ElectrICE.Factory of  
Electricity Meter  
Mfg. Co. Ltd.,  
Waterloo, Sydney.

## SOME SPECIAL FEATURES OF ELECTRICE REFRIGERATORS:

1. The automatic Cold Control which enables owners to set their own standard and ensures economy in operation. Once the required degree of cold is reached, the motor cuts out, resuming again when necessary.
2. Operation is silent and efficient.
3. **The Refrigerant.**—SO<sub>2</sub> is the refrigerant used, and is the only refrigerant available possessing all the following qualities:—
  - (a) Absolutely non-inflammable. Therefore, introduces no fire risk.
  - (b) Is non-explosive. (c) Is non-poisonous.
  - (d) Non-asphyxiating. Many other refrigerants are dangerous on account of their odour and anaesthetic effect. The odour of SO<sub>2</sub> is pungent and penetrating, and in the unlikely event of a system leak, a very small percentage of SO<sub>2</sub> in the atmosphere has such a stimulating effect that even a sleeping person is aroused.
  - (e) Perfect lubricating properties, reducing wear and tear on moving parts of the machine.
4. The wearing parts of the system are operated under ideal conditions. It works under a slow speed operation and is designed for much heavier duty than it is ever called upon to do.
5. It has an ideal lubricating system, and as it is handling cold gas at all times, no heating of working parts is possible.
6. Depreciation is negligible. The design of the plant provides for the replacement of every part subject to wear and tear with the minimum of disorganisation and expense, whilst the manufacturers being in Australia, any part or parts required can be immediately obtained.

## SIZES.

Approximate storage capacity of ElectrICE Domestic Refrigerators:—E.4, 4 cu. ft.; E.5, 5 cu. ft.; E.7, 7 cu. ft.; E.9, 9 cu. ft.; E.12, 14 cu. ft.

All Domestic Models can be supplied with motors suitable for operation by a house lighting plant.

Suitable ElectrICE Commercial Refrigerators are available for all hotel requirements, for butchers' cold rooms of all sizes, display counters for perishable food-stuffs, etc.

## SERVICE TO ARCHITECTS.

Expert collaboration in the preparation of specifications and estimates for refrigeration plant suitable for all Domestic and Commercial requirements.

## ELECTRICE DISTRIBUTORS.

All "New System" Branches at addresses on head of page, where expert staffs are maintained for the installation and subsequent servicing of ElectrICE Refrigerators, also State Electricity Commission of Victoria, William Street, Melbourne.







# STATE ELECTRICITY COMMISSION OF VICTORIA

32c

S.A.A. File No.

HEAD OFFICE: 22 WILLIAM STREET, MELBOURNE

Metropolitan Electricity Supply Showrooms: DISTRICT SHOWROOMS THROUGHOUT  
247 FLINDERS LANE, MELBOURNE VICTORIAS  
E  
C

Refrigerators

[For Other Products, See Pages 376, 410, 430]

## "ELECTRICE" DOMESTIC (ELECTRICAL) REFRIGERATION

### Installation and Servicing

Installation of domestic models can be effected to any suitably placed and earthed power point. Commercial models require special installation, and in all cases the work is supervised by the refrigeration engineers on the Commission's technical staff.

At the expiration of 12 months' free guarantee, the refrigerators are covered by a liberal servicing policy and consumers are assured of every attention.

Depreciation on an ELECTRICE machine is almost negligible and the design of the plant provides for the replacement of any part with a minimum of disorganisation and expense. This provision does not mean the replacement of the whole component, but only that part which is actually worn.

A very important consideration is that the works are situated in Australia, and therefore duplicate parts can be obtained at the end of the telephone, so to speak, and not at the other end of the world.

### Operation

ELECTRICE refrigeration is simple and accessible in design, silent in operation and has been built to endure. An important feature is the automatic operation, whereby the required temperature is controlled. Immediately the cabinet temperature rises, the motor is automatically switched on, thus causing the process of refrigeration to come into action; when the necessary fall in temperature has been effected, the motor is automatically stopped, thus preventing any waste of power. In addition to the automatic operation, each machine has, as standard equipment, the extra control called the temperature or cold control. This is of special design and enables the user to speedily adjust the temperature settings.

### Cooling Units

All ELECTRICE cooling units, or coils, are constructed entirely of copper, this being the best available metal, combining non-corrosive qualities with a high ratio of conductivity.

The "flooded system" is used throughout, as this is the most efficient method for heat absorption, and allows the use of an automatic pressure control, which is the most accurate form of control in existence.

A full range of coils is manufactured, including domestic (with ice-making facilities), liquid cooling coils and the latest designed cross-fin coil for commercial work. The cross-fin coil is the biggest advance yet made in commercial coils.



Type E4—Cooling Unit.

### Compressor Units

Compressor units are simple and compact in design and great care has been taken in the selection of materials to ensure dependable operation and long life.

Compressors range from the small domestic model operated by a 1-6 h.p. motor to the largest commercial unit driven by a 3 H.P. motor.

Each compressor is a precision engineering product, and is of the reciprocating type.

Efficiency is enhanced by the use of large finned copper condensers, which have a much greater "surface" than those on imported machines, thus resulting in lower operation and maintenance costs. The quietness of operation is remarkable.



Type D—Electrice Compressor Unit.

### Made in Australia

ELECTRICE refrigerators are an Australian product being manufactured by the Emmco Works in Sydney. In addition to servicing advantages due to facility in obtaining any duplicate parts, is the fact that the machine has been specially constructed for local climatic conditions.

### Multiple Installations

A multiple installation consists of two or more cabinets operated from one unit.

ELECTRICE is particularly adaptable to this form of installation, the main consideration, from the buyer's view-point, being a saving in initial cost.

Blocks of flats, or a combination of commercial cabinets may be installed on the multiple system.

(Continued on next page.)



### Models Available

The following domestic models are available, and cover a range suitable for installation in dwellings of varied sizes:—

#### Brief Specifications of Domestic Models.

Model	Gross Storage Capacity (approx.)	Nett Storage Capacity (approx.)	Height	Width	Depth	Shelf Space (approx.)
	Cu. ft.	Cu. ft.	in.	in.	in.	Sq. ft.
E4	4.32	3.61	53	25½	21	5.5
E5	5.64	4.89	54½	26	22½	7.6
E7	7.95	7.09	59	28	26	9.4
E9	9.75	8.71	64	30	26	12.5
E12	14.61	12.88	64	41½	26	18.0



Electrice — E4 Model.

Suitable for small households or flats.



Electrice — E12 Model.

Suitable for large residences, guest-houses, private hospitals, etc.

### Built-in Cabinets

Smaller-sized models are available without cabriole legs, thus becoming suitable for building-in to the kitchen or pantry; also special cabinets may be obtained with the compressor unit detached and operated from a basement or other portion of a building. In such cases, the exterior dimensions (height) of the cabinet are reduced by about one-third.

### Advantages of Electrical Refrigeration

#### Health—

Foods are kept in a dry atmosphere of under 50 deg. F., thus preventing fermentation of foodstuffs.

#### Food Spoilage—

Saving in foodstuffs is considerable, and more than offsets operation cost.

#### Operation Costs—

Usually about one-third that of ice, notwithstanding greater efficiency.

#### Convenience—

No worry re ice man.  
No cleaning up mess.  
Less frequent shopping.  
Quicker and more effective cooling.

The above advantages which are obtained per medium of an ELECTRICE refrigerator add materially to the saleability of any dwelling.

(Continued on next page)

### Cabinet Construction

All cabinets are strongly constructed and designed for a maximum of convenience, combined with appearance.

Insulation is of moisture-proofed cork-board, of a thickness to suit refrigeration requirements, and never less than 2 inches. Corkboard, of course, is unexcelled as a suitable insulating medium.

Domestic cabinets are finished in white "ducoed" steel, with seamless interiors of white porcelain enamel.

Commercial cabinets may be obtained in any size, design and finish.



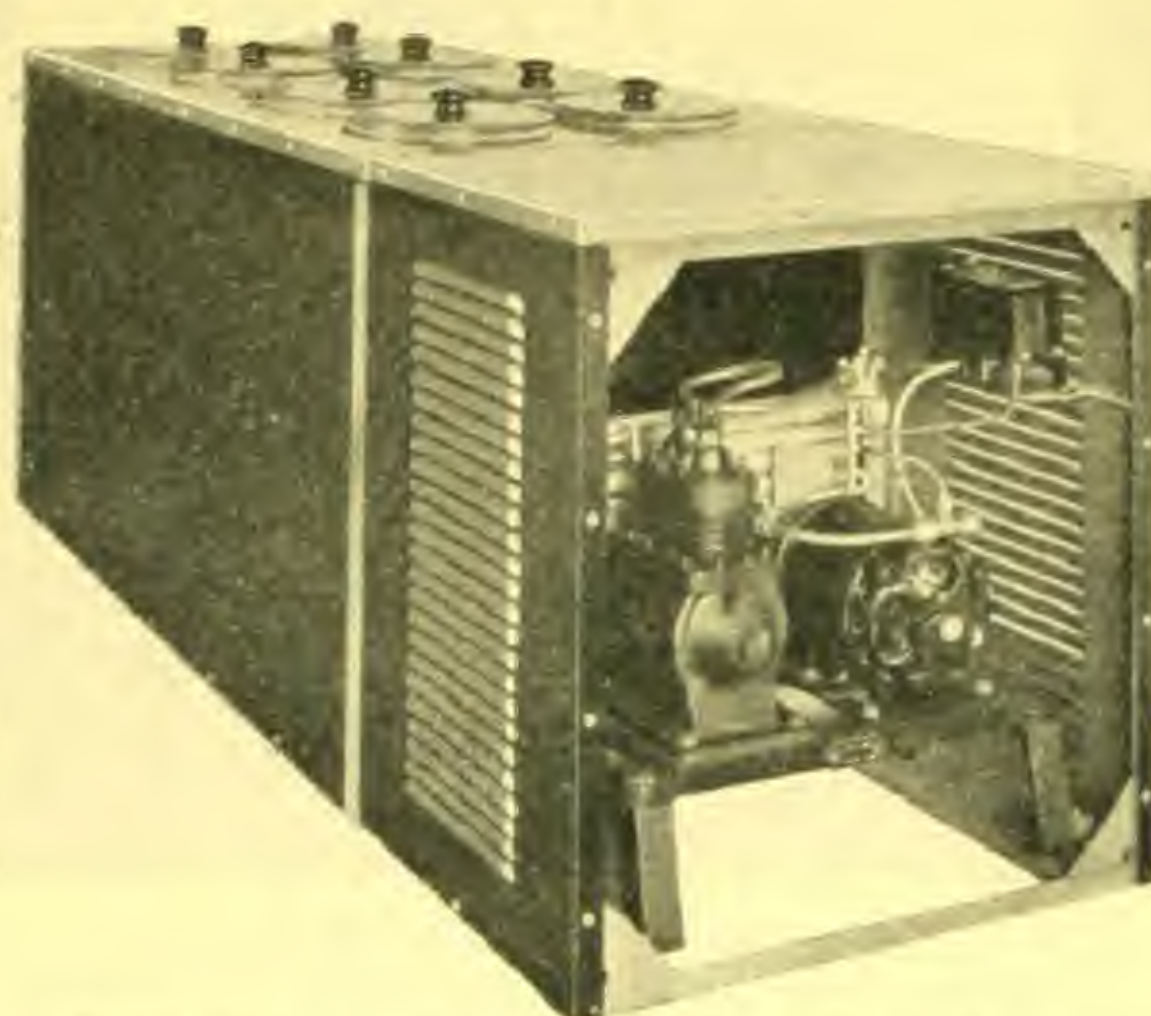
## "ELECTRICE" COMMERCIAL ELECTRICAL REFRIGERATION

### ICE CREAM CABINETS

#### Advantages of Electric Ice Cream Cabinets

The chief advantages of the electric ice cream cabinets are:—

- (a) Elimination of loss due to shrinkage or thawing.
- (b) Provision enabling a greater variety to be stocked.
- (c) Saving in time and trouble.
- (d) Production of a better product.
- (e) Storage under hygienic conditions.



Eight-Hole Ice Cream Cabinet (Double Row).  
End panel removed to illustrate Compressor Unit.

Thus the make-shift method of packing with ice and salt has been overcome, and the retailer has available automatically controlled equipment which will produce the constant low temperature so essential to this class of business.

ELECTRICE ice cream cabinets are made in a complete range from two holes to twelve holes and are available with round holes for bulk ice cream or square holes for package goods. The cabinets are attractively finished in black duco on steel, with polished monel metal tops for ease in cleaning. Insulation is of moisture-proof cork-board, ensuring the minimum of operating costs.

#### Exterior Dimensions

Cabinet	Height	Width	Depth	Holes	
				Round	Square
2-Hole	2 ft. 8½ in.	2 ft. 11½ in.	1 ft. 8½ in.	1	1
3-Hole	2 ft. 8½ in.	3 ft. 11 in.	1 ft. 8½ in.	1	2
4-Hole Single Row	2 ft. 8½ in.	4 ft. 10½ in.	1 ft. 8½ in.	2	2
4-Hole Double	2 ft. 8½ in.	2 ft. 11½ in.	2 ft. 6½ in.	2	2
6-Hole Single	2 ft. 8½ in.	6 ft. 9½ in.	1 ft. 8½ in.	2	4
6-Hole Double	2 ft. 8½ in.	3 ft. 11 in.	2 ft. 6½ in.	2	4
8-Hole	2 ft. 8½ in.	4 ft. 10½ in.	2 ft. 6½ in.	4	4
10-Hole	2 ft. 8½ in.	5 ft. 10 in.	2 ft. 6½ in.	4	6
12-Hole	2 ft. 8½ in.	6 ft. 9½ in.	2 ft. 6½ in.	6	6

#### Butchers' Cool Rooms

ELECTRICE is specially designed to meet the exacting and difficult conditions required for the refrigeration of butchers' rooms. The cross-fin coils employed occupy little space and, due to their extraordinary efficiency, they introduce a standard of refrigeration hitherto unknown. The humidity is definitely controlled, natural circulation of air is attained, and temperatures are constant. Under these conditions the shrinkage of meat is reduced to a minimum, the colour is excellent, and wastage is eliminated.

Automatic operation of ELECTRICE frees the user from maintenance worries—especially during holiday periods.

The operating cost of ELECTRICE is materially lower than (in some cases only one-third) the cost of ice.

#### Commercial Cabinets

ELECTRICE produces standard cabinets from 15 c.ft. capacity to 100 c.ft., and these can be equipped with ice-making coils or finned coils (which do not make ice).

These cabinets are insulated with cork-board, specially prepared and wrapped, and are finished in oak, maple, or white duco. One-piece linings, porcelain enamelled, may be fitted up to 50 c.ft.; larger cabinets are lined with zinc or galvanized iron.

The shelf layout can be designed to fulfil special requirements.

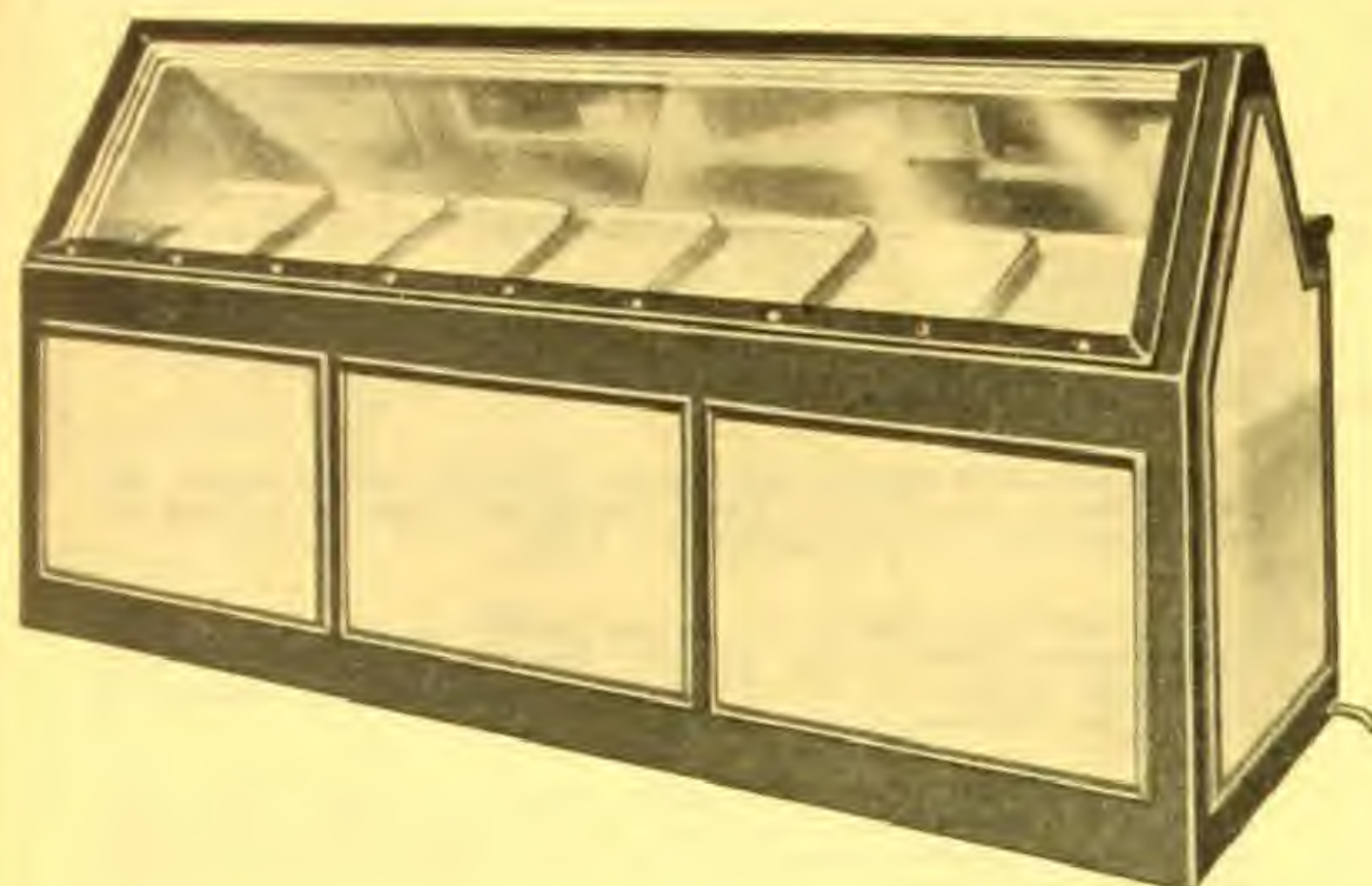


Butchers' Cool Room.  
Note accessible position of the Compressor Unit.

(Continued on next page.)



## DISPLAY CABINETS



Eight-foot Maple Combined Display and Storage Counters (Front View).

Electrical refrigeration has been responsible for the introduction of refrigerated displays, which are of particular value to retailers of perishable goods. A display is considered essential to attract trade, but a summer display of certain products is impracticable unless encased in an electrically refrigerated display cabinet.

ELECTRICE display cases and counters may be had

in any design or size to suit individual requirements. Special designs are built for butchers and smallgoods men, and they may be internally lighted with concealed lights.

A refrigerated display means an all-the-year-round display, and thus enables full value to be obtained from ground rent and overhead expenses.

## FISH BOXES

The preservation of fish is one of the most difficult of refrigeration problems, and ELECTRICE has produced for the fishmonger storage cabinets of unique design. These cabinets have proved entirely successful in their field and can be thoroughly recommended for fish storage.

The fish box is of the bin type, each bin being subdivided with shelves and rectangular baskets in order to attain ease and utility in handling.

The cabinet is finished in black duco with a monel metal top and lids, and is built to maintain low temperatures, with marked economy of operation.

## DIMENSIONS (Exterior)

	Height	Width	Depth
(1)	30in.	6ft.	30in. (2 bins)
(2)	30in.	7ft. 4in.	30in. (2 bins)
(3)	30in.	10ft.	30in. (3 bins)

Fish Box and Unit Combined.  
(Portable Type).

## BEER COOLERS

ELECTRICE equipment is eminently suited for the cooling of draught beer. Automatic temperature control ensures a foaming measure always at 50 deg. F., regardless of the fluctuations of air temperatures.

The busiest period can be effectively handled by the ELECTRICE-equipped bar, and the sudden and almost

continuous demand of the peak hour (5 p.m. to 6 p.m.) can be adequately and automatically taken care of.

Operating costs are only a fraction of the cost of ice.

ELECTRICE Refrigerators are also available in all sizes for bottle cooling.



<p style="text-align: center;"><b>32c</b></p> <p>S.A.A. File No.</p>	<p style="text-align: center;"><b>R. WERNER &amp; CO. PTY. LTD.</b></p> <p style="text-align: center;">ENGINEERS</p> <p style="text-align: center;">54-84 BURNLEY STREET, RICHMOND, VICTORIA</p> <p style="text-align: center;">Tel. J 1161, J 1087</p> <p style="text-align: center;">Interstate Agents:</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p><b>NEW SOUTH WALES:</b></p> <p>Messrs. Stuart Walker &amp; Co. Ltd., 174 Clarence Street, Sydney.</p> <p>Mr. R. J. Lindsay, 99 Kippax Street, Sydney.</p> </div> <div style="width: 45%;"> <p><b>SOUTH AUSTRALIA:</b></p> <p>The Implement Co., Bank Street, Adelaide.</p> <p><b>WEST AUSTRALIA:</b></p> <p>Mr. W. G. Davies, Cambray Chambers, St. George's Terrace, Perth.</p> </div> </div> <p style="text-align: center;"><b>QUEENSLAND:</b></p> <p>The Engineering Supply Co. of Aust. Ltd., Edward &amp; Charlotte Streets, Brisbane.</p>	<p style="text-align: center; font-size: 2em;"><b>W</b></p> <p style="text-align: center;">WERNER ELECTRIC</p> <p style="text-align: center;">MADE IN AUSTRALIA</p>
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## WERNER ELECTRIC REFRIGERATION

### Products

Werner Ammonia Compressors in Enclosed and Horizontal types from  $\frac{1}{2}$  to 150 tons daily refrigerating capacity. Werner Electric Refrigerators in  $\frac{1}{6}$ th to  $1\frac{1}{2}$  h.p. Also, Brine and Ice Tanks, all classes of Coils. Insulation of Cool Chambers, Corkboard and Cool Chamber Doors and Fittings—Anything for Refrigeration.

### Commercial Refrigeration

The Werner line of Refrigerating Plants may be applied to any form of "cold production," whether for plain food storage, liquid cooling, ice making, air conditioning or any service for which a lower temperature than the surrounding atmosphere is required.

**AUTOMATIC CONTROL AND REFRIGERATOR SAFEGUARDS.**—The Werner Electric Refrigerator is started and stopped by pressure switch, or thermostat, as may be most suitable for the particular installation and, in addition, is protected from operating at excess pressure due to conditions beyond control. This excess pressure cut out automatically re-starts the machine when conditions return to normal. In addition, the motor is protected from overload beyond the safe limit by an electrical cut-out device. In starting up, the compressor is guarded from a heavy rush of return gas by the pressure cut-out valve, which is adjustable for every purpose.

**THE COMPRESSOR.**—All Werner Electric Compressors are twin-cylinder fitted with silent valves and run in a deep oil bath permitted by the special Oil Trap.

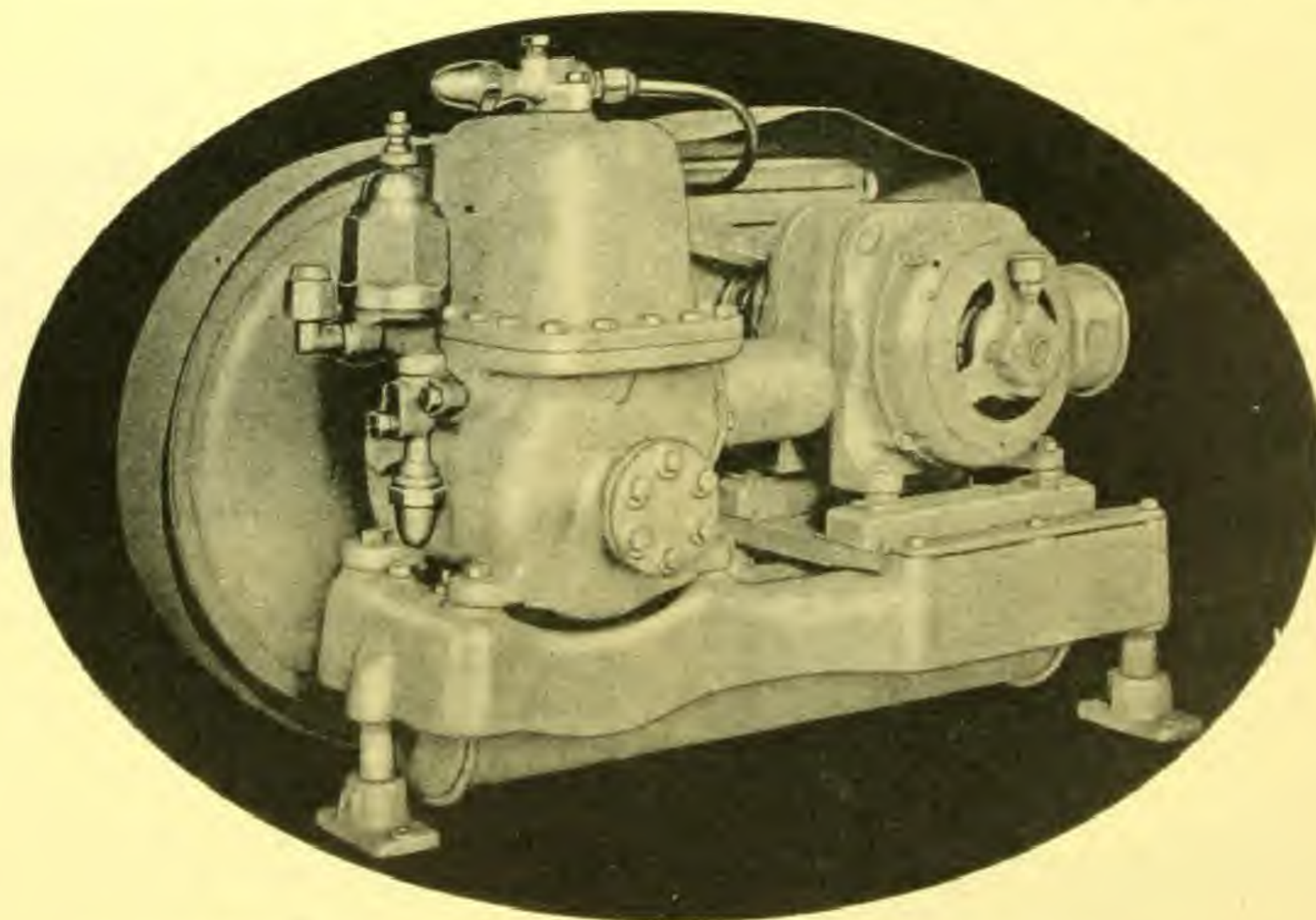
**THE MOTOR.**—Motor of ample power and exact voltage requirements provide the Werner Electric Refrigerator with a reliable source of silent power. Single phase motors of Australian manufacture.

**EVAPORATOR OR COOLING UNIT.**—Flooded or direct expansion type of plain or finned coils to suit application. Ice making and salad draws for small cabinets. All cooling surfaces adequate to provide ample cooling and minimum dehydration.

**THE AIR-COOLED CONDENSER.**—Radiator type condenser, cooled by a fan on the motor shaft. This type of condenser with fan, has ample capacity and is the perfection of efficiency. No water is required with this type, but water-cooled condensers are available for special installation.

**THE REFRIGERANT.**—Methyl Chloride is the coldest and safest refrigerant practical for electric refrigeration. Its operating cost is low. It has no obnoxious or suffocating odours, and is non-corrosive and is the least toxic of refrigerants available for commercial service.

**OIL TRAP.**—Perhaps the outstanding achievement is an exclusive oil trap, which enables Methyl Chloride to be used as a refrigerant without the possibility of oil going into the cooling unit. By overcoming this one difficulty you are able to enjoy the many benefits of Methyl Chloride.



One-third and one-half h.p. Models Werner Electric Refrigerator.  
The clean trim exterior appearance of the unit bespeaks the care given to every detail.



The difficulty with the use of Methyl Chloride in the past has been that the oil worked from the pistons through the valves into the refrigerant. The oil, then, would dissolve some of the refrigerant, lowering the efficiency. This is ingeniously overcome by trapping the oil before it gets to the cooling unit. This is done by distilling off the refrigerant from the oil by means of the heat of compression and constantly returning the oil to the crankcase. No oil ever leaves the compressor, and the oil in the crankcase is always kept at a high level. Experienced refrigeration men will recognise the importance of this feature.

### Capacities and Sizes of Units

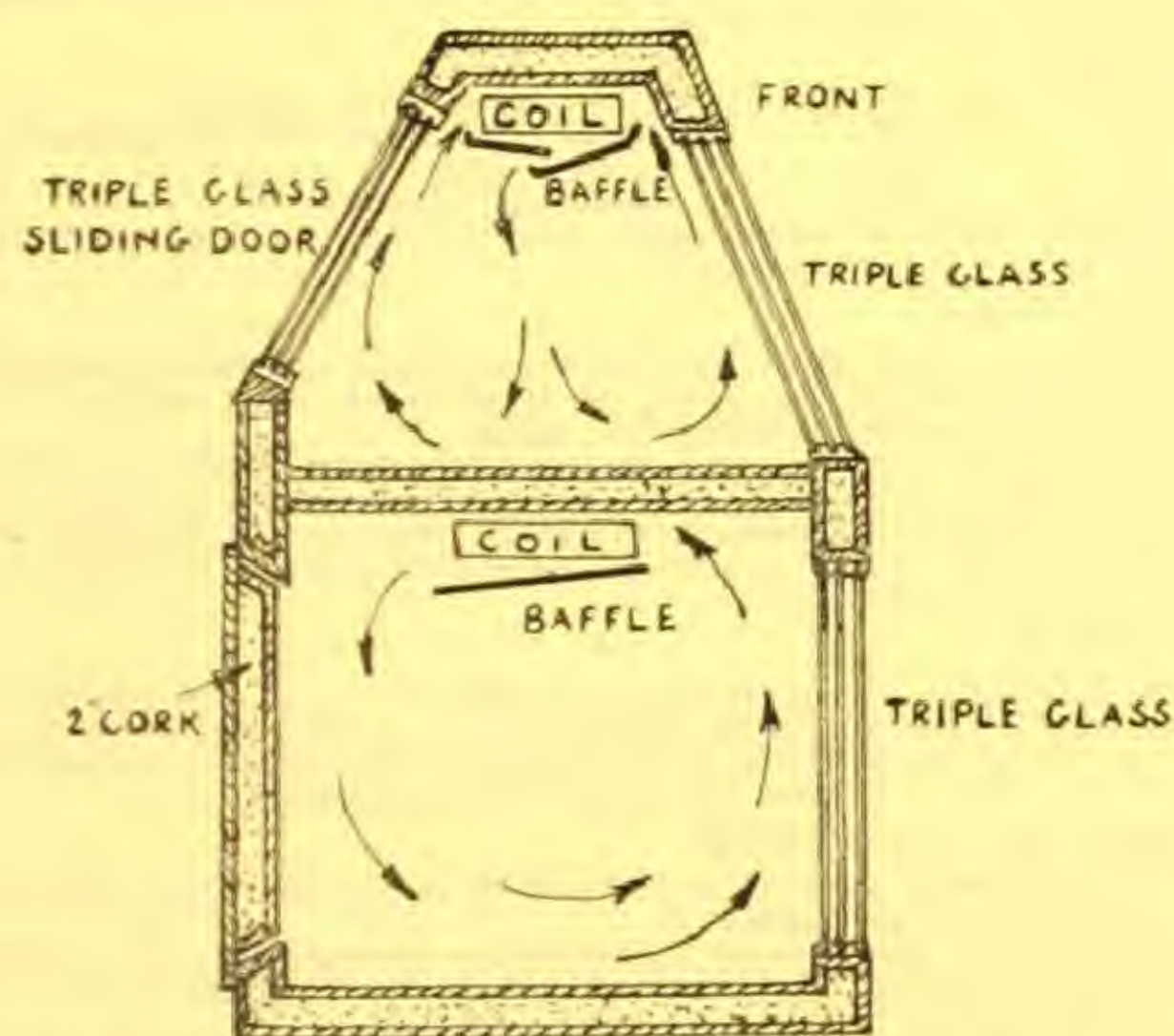
Horse-Power of Motor.	Capacity in cub. ft. of well-insulated food storage space in one chamber or cabinet—Reduced capacity up to 50 per cent. less when a number of cabinets comprise the capacity.		
	Private Houses.	Institutions.	Shops.
1/6	4.3		
1/3	150	140	135
1/2	250	235	215
3/4	400	350	325
1	600	500	430
1 1/2	800	750	650

### Installation

The Werner Electric Units are installed and serviced by skilled mechanics. All connecting pipes are run plumb and level, well stayed from vibration and neatly bent as required.

### Location of Refrigerating Unit

One outstanding advantage of the Werner Electric is in its ability to perform its work from any position, either above or below the chamber or cabinet which it refrigerates.

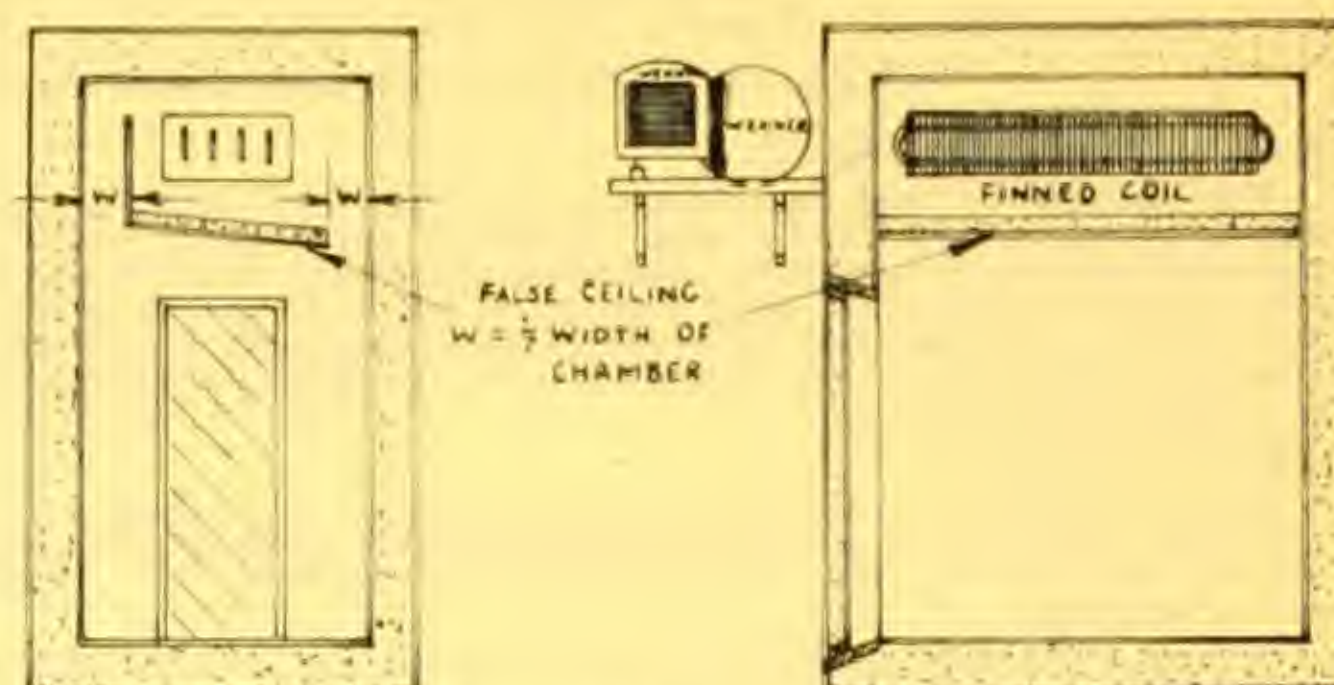


WERNER HIGH COUNTER WITH STORAGE SPACE

### "Werner" Refrigerated Counter and Cabinets

R. Werner & Co. Pty. Ltd. offers a variety of standard and special cabinets and counters from nine cubic feet upwards. Prices on application.

**CONSTRUCTION AND INSULATION.**—All construction is the best possible in its class, great care being taken to obtain



WERNER ELECTRIC INSTALLATION

an air-tight and robust job. Insulation of corkboard in thickness to suit application. All properly sealed with hot bitumen.

**FINISHES.**—Internal: Porcelain Enamel, Silveroid Tinned Copper, Galvanized Iron or Painted Wood. External: White or Coloured Lacquer over Iron. Polished Wood or Painted Wood.

**EQUIPMENT.**—All cabinets and counters are equipped with best quality nickel or chromium plated hinges and catches, and all doors close on to single or double Wirfs. Air-tite Gaskets.

Locks can be fitted at extra cost if required.

Ice-cube making drawers provided with small cabinets when required.

### Large Refrigerating Installations

In large institutions the demand for cold storage service exceeds that which can be economically supplied by the Werner Electric Units; we offer the larger commercial ammonia plants operating on automatic control, brine storage, or brine circulating system.

### Household or Domestic Cabinets

The Werner Line of Refrigerators is completed by the inclusion of an exceptionally well-designed Domestic Cabinet of 4.3 cubic feet capacity and 8.2 square feet of shelf space. Two ice-making drawers of four lbs. capacity in 56 small cubes are included. Inside finish is in white porcelain enamel and outside in gleaming white lacquer with chromium-plated hardware.

In common with other "Werner" Refrigerators, this unit is air-cooled and silent in operation, and is thermostatically controlled direct by temperature.

The refrigerant is Methyl Chloride, and the entire change of gas can be liberated into an ordinary living-room without injurious effect to the occupants.

### Cool Chamber Doors and Insulation

R. Werner & Co. Pty. Ltd. specialise in the supply, erection and finishing of corkboard and other insulation. Also the latest type Cool Chamber Doors and fittings in duco or plated finishes.

### Engineering Service to Architects

Almost every refrigerating layout calls for different treatment and our designing staff is always available to advise in the matter of insulation, position of machinery, etc.



# SPECIFICATION OF MECHANICAL REFRIGERATION INSTALLATION

(Prepared by the Architectural Staff of Ramsay's Catalogue from Authentic Sources)

(This Specification is suitable, more particularly, for a Hotel or Hospital Installation)

## EXTENT OF CONTRACT

The purpose of this specification (together with accompanying drawing) is to supply and install in operation a motor-driven ammonia compressor, ammonia condenser and receiver, ice making brine tank with expansion coils, all brine piping and coils in refrigerating cabinets or cool chambers, insulating covering and every other accessory that is usually included in a refrigerating system.

## PERFORMANCE

The system shall be designed to refrigerate all refrigerator cabinets, rooms or chambers by means of a brine circulating system and also to have a capacity to manufacture ..... lbs. of ice per day.

Temperature ranges shall be maintained in the following refrigerator cabinets and rooms:—

- Meat Refrigeration—  
34 degrees to 38 degrees F.
- Fruit Storage—  
38 degrees to 42 degrees F.
- Dairy Produce—  
36 degrees to 40 degrees F.
- Fish Box—  
30 degrees to 34 degrees F.
- Ice Storage—  
24 degrees to 26 degrees F.
- Garbage Refrigerator—  
36 degrees to 38 degrees F.
- Pantries—  
38 degrees to 44 degrees F.

## (HOSPITALS):

- Mortuary—  
30 degrees to 32 degrees F.
- Chemical or Bacteriological  
Laboratory—  
30 degrees to 34 degrees F.

## COMPRESSOR

Supply and install on foundations provided by others a ..... ton single (or twin) cylinder horizontal double-acting (or enclosed vertical type) Ammonia Compressor, complete with steel oil trap and drain valve, lubricator, spanners and foundation bolts.

The Compressor capacity shall be based on a piston displacement of 7,500 cubic inches per minute per ton.† The flywheel shall be grooved for multiple vee belt drive (or turned flat for direct coupling).

\*One ton of refrigeration (based on the standard rating) is equal to 288,000 B.T.U.'s per day when working with an evaporator temperature of 5 degrees F., and a condensing temperature of 86 degrees F.

†The sub-contractor should state in his tender the bore of cylinder, stroke of piston and revolutions per minute.

## CONDENSER

The Condenser shall be a ..... ton Double Pipe Condenser made of 2 in. outer and 1½ in. inner heavy duty ammonia piping fitted with easily attachable water bends, air valve, liquid receiver, and be properly valved. The total length of the condenser coil shall not be less than 30 ft. per ton of refrigeration. It shall be arranged for suitable cleaning and located in the position as shown on plans. (Or—the Condenser shall be a ..... ton Atmospheric Type Condenser made of 1½ in. heavy duty ammonia piping, not less than 100 lineal ft. per ton, wound into an oval shape and complete with oval saw-tooth water spreader, air valve, liquid receiver, and be properly valved.)

The Condenser shall be given two coats of bituminous paint before erection, and mounted or placed in position where shown on plans.

## RECEIVER

The Receiver shall be a welded steel liquid ammonia receiver with inlet and outlet valves and oil chain valve; the capacity of the Receiver shall be ..... lbs. It shall be suitably mounted and rest on the floor where shown on plans.

## STOP AND EXPANSION VALVES

Provide all necessary stop and expansion valves in the expansion coils in brine tank.

## AMMONIA PIPE AND FITTINGS

Supply and fix all ammonia piping from the compressor discharge to condenser, ammonia receiver and expansion coils, and from the expansion coils back to the suction connection on compressor; this work shall include drop-forged flanged fittings (4 bolt type, for pipes 1 in. and upwards), valves, by-pass, gauge connection and necessary gauges, traps, etc., necessary to complete the installation.

## BRINE TANK

The Brine Tank shall be ..... x ..... x ..... deep, made of 1 in. steel plate, electrically welded inside and outside, and fitted with all necessary tee iron stays and bars to support ice moulds. The tank shall be given two coats of bitumen paint before erection on site, and be insulated, as later specified.

## ICE MOULDS

The Ice Moulds (..... in number) shall be of not less than 18 gauge galvanized iron, having the following inside dimensions ..... x ..... at top and ..... x ..... at bottom,

by ..... deep, securely riveted together and provided with angle iron reinforcing band at top and provision for lifting cans from tank.

## BRINE TANK COILS

Supply and install in the Brine Tank, a set of ..... ft. 1½ in. heavy duty continuous ammonia piping Expansion Coils arranged in circuits. A minimum of 125 lineal feet of 1½ in. piping or equivalent shall be provided for each ton of refrigeration.

## BRINE PIPING AND COILS

Provide all flow and return wrought-iron brine piping in connection with this installation from the circulating pump to all coils in refrigerators and cool chambers and thence back to tank.

All refrigerators and cool chambers shall be fitted with brine coils of such length and design as to maintain the specified temperatures. Gate valves of approved manufacture shall be provided for isolating each set of coils and to be placed where required in a convenient position.

Paint all coils with two coats of bitumen paint unless already galvanized. Piping to be insulated, as later specified.

## PUMPS

The BRINE Pump shall be a single-stage centrifugal pump fitted with bronze impeller of such capacity as to maintain a satisfactory brine circulation and be designed for brine service.

The CONDENSER Pump (for use in connection with the atmospheric type condenser) shall be a centrifugal (or plunger type) capable of delivering water to the condenser spreader at a minimum rate of 100 gallons per minute per ton refrigeration. These Pumps shall be directly connected through flexible coupling, to motors, each motor and pump shall be mounted on an integral cast-iron bedplate.

shall be directly connected through flexible coupling, to motors, each motor and pump shall be mounted on an integral cast-iron bedplate.

## OPERATION OF THE SYSTEM

The sub-contractor shall charge the refrigerating system, supplying the necessary anhydrous ammonia, lubricating oils, and calcium chloride brine of correct density to prevent freezing on expansion coils.

## MOTORS

- Supply and install the following electric motors:—
- 1 ..... H.P. .... phase A.C. Motor for Compressor.
- 1 ..... H.P. .... Brine Pump.
- 1 ..... H.P. .... Condenser Pump.

Complete with all starting apparatus and wiring from point of entry in Compressor room.

## INSULATION

The brine tank shall be insulated with 5 in. thick corkboard on bottom and 8 in. thick of granulated cork and/or 5 in. corkboard, cement rendered at sides.

All ammonia and brine piping subject to frosting shall be continuously insulated with three thicknesses of hair felt applied with hot bitumen, properly wound and finished with canvas neatly sewn or, if in trenches, with granulated cork and bitumen insulation.

## TESTING

All ammonia piping shall be tested to ..... lbs. per square inch and all brine piping tested to ..... lbs. per square inch (or to the requirements of any public body having jurisdiction over the work) before the insulation is applied.

## WORK NOT INCLUDED

The following work is not included in the Contract and shall be carried out by others:—

Compressor and Motor foundations (templates for locating foundation bolts shall be supplied by refrigeration sub-contractor).

Refrigerators and Cool Chamber. (See Index for Insulation.)

Brine Tank Enclosure and Top. (Either with masonry enclosure walls or wood linings.)

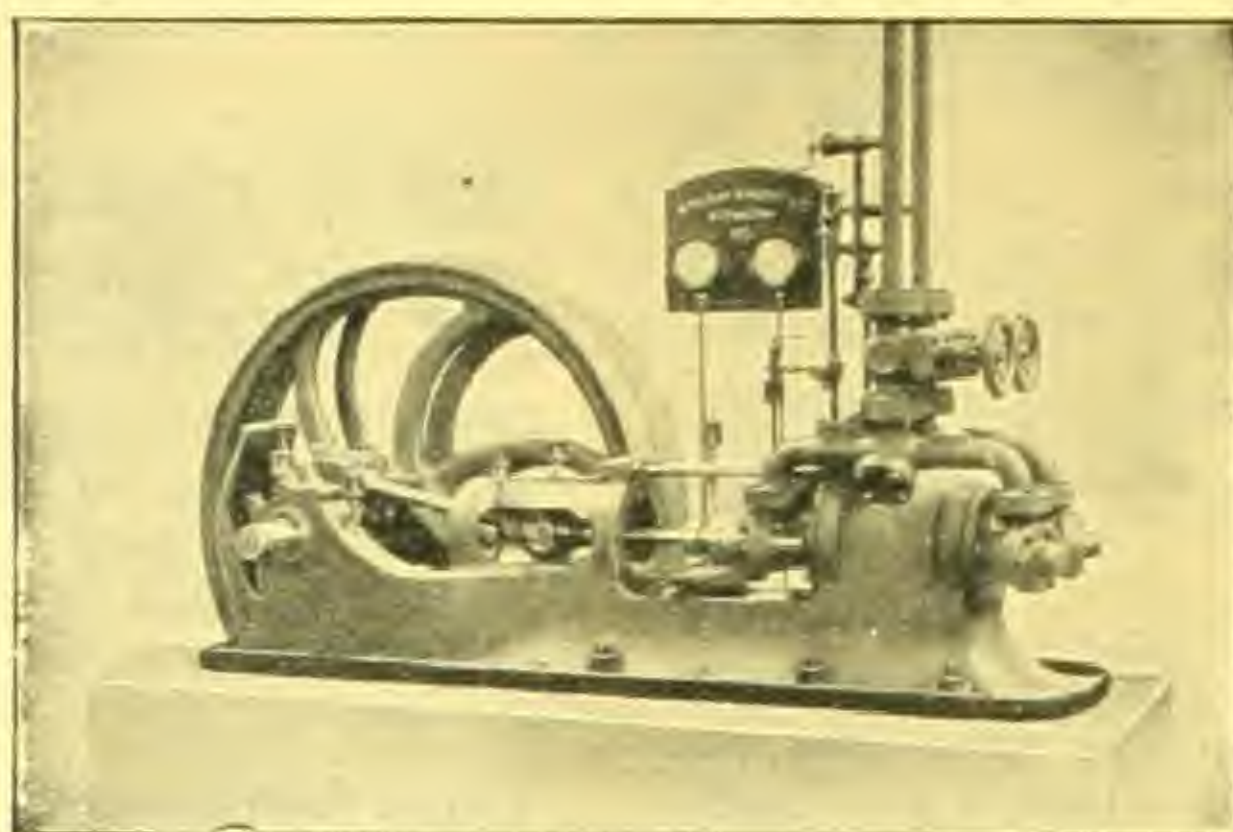
Water Supply and Return or Waste Lines.

## GUARANTEE

The Contractor shall guarantee the refrigerating plant as specified herein for Twelve Months from date of starting work and shall undertake to supply any broken or defective part during that period, providing the same is not caused through carelessness or want of attention on the part of the attendant; fair wear and tear excepted.

## FREE SERVICE

During the period covered by guarantee, the Contractor shall give free service and shall at all times be pleased to give advice on the operation of the plant.



A Typical 6-Ton, Medium Speed, Horizontal, Double-acting Ammonia Compressor.  
(Courtesy R. Werner & Co. Pty. Ltd.)



## SECTION P

[Containing S.A.A. Filing Section No. 33]

### LIFTS





33a

S.A.A. File No.

# HYDRAULIC POWER, ELECTRIC AND HYDRAULIC LIFTS LIMITED

*Lift Contractors and General Engineering*

14 MARTIN PLACE, SYDNEY

HYDRAULIC  
AND  
ELECTRIC  
LIFTS

## HYDRAULIC LIFTS

### The Company

The company are suppliers of power under high pressure system (700 lbs. pressure per square inch) to Passenger Lifts, Goods Lifts, Wool Dumps and Presses, and all other classes of machinery, continuously day and night throughout the year.

### Service

Lifts and Machinery worked by the company's power have given satisfaction since their installation, dating back twenty, thirty and forty years ago. The supply never ceases, and is always on hand and reliable, whenever required, by simply opening the lift valve.

### Mains

The company controls all the feed mains of its own Water Supply for the use of clients' requirements in whatever capacity is required, such exclusive feeding service maintaining a continuity of supply to each installation. A comprehensive survey layout showing the various routes of the company's mains can be inspected at the head office.

There are fifty miles of pressure mains laid throughout the principal streets of Sydney.

### Speed

Hydraulic lifts are designed and constructed to travel with safety and comfort at fast speeds with full loads, conforming at all times to the regulations as laid down by the Lifts and Scaffolding Department of New South Wales. Properly constructed, they are quick and smooth in running and economical in upkeep.

### Reliability

The machinery and equipment is installed for long and reliable service, and manufactured and equipped under conditions which maintain maximum efficiency in all departments of lift engineering. Owners who desire to ensure that tenants and their clients can travel up and down from the various floors of their building at all times with certainty and safety should insist upon having an up-to-date hydraulic lift installed in all their premises.

### Life and Operation

There is practically no limit to the life of an Hydraulic Lift, and no limitation in performance; its action is controlled by sound and simple mechanism, which has few wearing parts. In London, Sydney and Melbourne, installations are giving excellent performance after forty years' service.

### Maintenance

The company at all times provides service for the maintenance of all installations, securing to clients special supervision by the Company that is most

interested in prolonging the usefulness of the Hydraulic Lifts.

### Charges

After adjustment for interest on the initial cost is taken into account, together with renewals, repairs and maintenance, special reserve to replace complete installation at a given period, and cost of power, the Hydraulic Lift will be found an up-to-date economical proposition.

### Fire Prevention Features

As a special feature can be added the adaptability of the hydraulic service to all fire sprinkler and drencher equipment, thus reducing cost of insurance for fire risk by 50 per cent. The company have an adequate and independent freehold supply of water which, being used from its own mains, can maintain service to all the requirements demanded, doing away with the necessity of tank installation overhead.

### Service to Architects

Our technical and engineering staff are at all times available in giving the fullest consideration and assistance to all who desire information in regard to hydraulic and electric lift installations, and any request for assistance and service will be promptly and efficiently given at the head office.

### Information

Authentic information concerning Hydraulic Lifts, etc., and the Company's Power, can only be obtained at the Head Office of the Company—outside information is mostly guesswork.

### ARCHITECT'S SPECIFICATION

**DUTY.**—The lift shall be installed for (passenger) (goods) traffic and shall have a net lifting capacity of ..... (hundredweights) (persons) at a speed of ..... feet per minute.

**TRAVEL.**—The travel of the lift shall be ..... feet, serving ..... floors, ..... openings.

**CONTROL.**—The system of control shall be by hand-ropes.

**CAR.**—The lift car shall have approximate dimensions of ..... feet wide by ..... feet deep by ..... feet clear height under the bow.

**RAM.**—The ram shall be of the direct (or indirect) acting type, designed to operate at a pressure of 700 lbs. per sq. inch in the cylinder.

**CONNECTIONS.**—Pipe connections shall be provided to supply pressure water from Hydraulic Power, Electric and Hydraulic Lifts Limited's mains, and exhaust water connections made to drain.

**P.C. SUM.**—A P.C. sum of £..... shall be allowed for the complete supply, installation, and connection of the lift by the Hydraulic Power, Electric and Hydraulic Lifts Limited to their detailed specification.

**Notes.**—In the direct-acting ram type of lift installation the lift shaft should allow for car guides only, and a shaft sunk to a depth of a few feet greater than the lift travels to accommodate cylinder.

For the indirect-acting type of lift installation, allowance should be made, when determining the size of shaft, for the hydraulic cylinder (which is mounted on the wall of shaft) in addition to the car guides.



## ELECTRIC LIFTS

## Products

Westinghouse Electric Lifts, variable voltage or rheostatic with car switch or push button control, automatic inductor control for floor landing; floor button inductor control.

## Installation

Hydraulic Power Electric and Hydraulic Lifts Limited are now fully equipped for carrying out the installation of Westinghouse Electric Lift, which features the following factors, ensuring fine performances:—

1. Extensive electrical experience.
2. Conservative ratings.
3. Any type of control.
4. Excellence of installation.

## Variable Voltage Control

Westinghouse lifts, equipped with variable voltage control, may be operated by either a car switch or push button. This system automatically accelerates and decelerates the car at greatest speed consistent with comfort to the passengers. All jerking and jarring of the cars are eliminated, giving a smooth motion impossible to secure by other methods. The variable voltage current is supplied to the elevator motor by a motor-generator set, and as the motors are supplied for all commercial circuits, the system may be applied wherever electric power is available, either alternating or direct current.

## Automatic Inductor Control

Westinghouse automatic inductor control for passenger lifts brings the car to a stop, level with the floor, resulting in fast and accurate landing. The car never stops short of the floor nor runs beyond it. Its operation does not depend

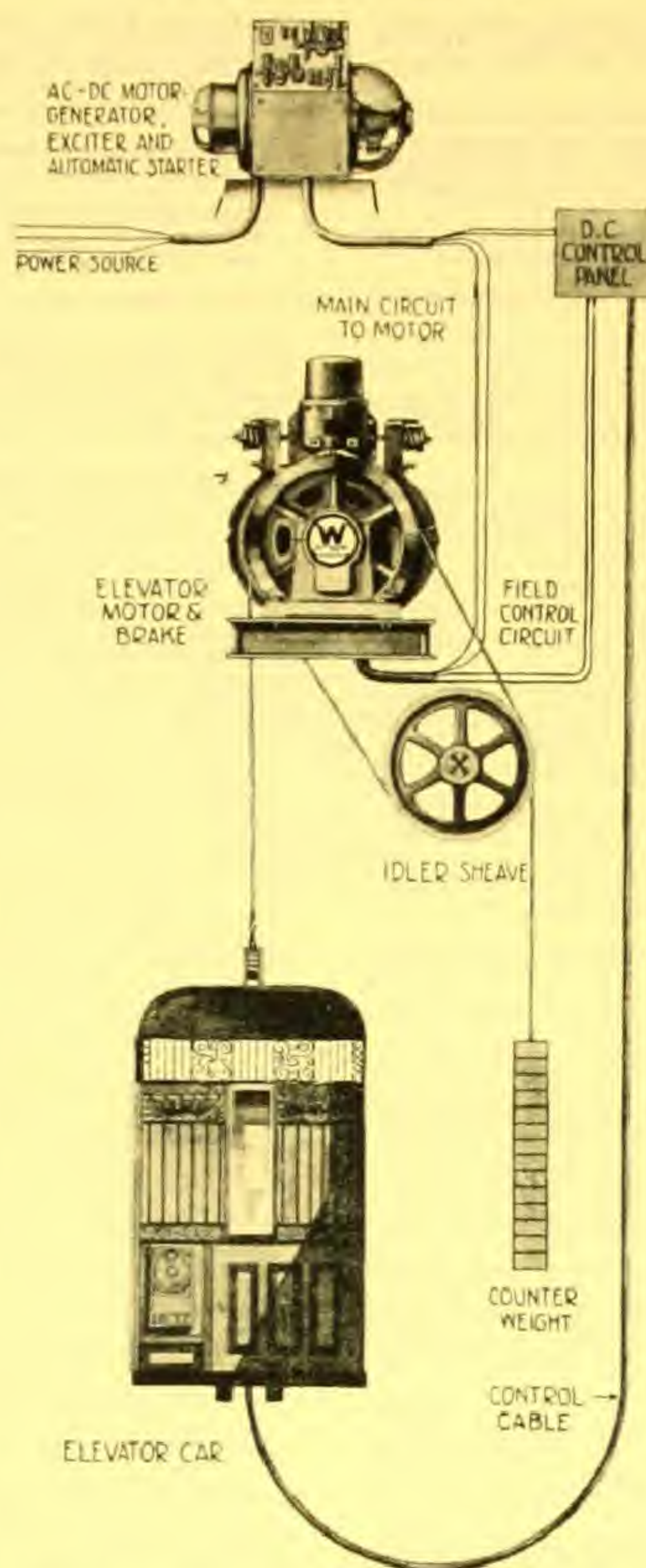


Diagram showing complete Variable Voltage Equipment.

on the skill of the operator. This equipment eliminates false stops by taking the car directly to the floor. This improved system utilises variable voltage control and does not require the use of auxiliary motors or other complicated apparatus. The equipment gives rapid, though extremely smooth, starting and stopping. The control is simple and reliable, as there are no mechanical contacts between the car and the inductors in the hatchway.

## Push Button Control

Westinghouse elevators are designed with push button control, car switch control, or a combination of both. Automatic push button control is desirable in many installations, as the cost of an attending operator is removed.

## Floor Button Inductor Control

For applications requiring more completely automatic operation in the modern buildings, Westinghouse Floor Button Inductor Control represents the highest type of elevator control. With this system all calls are registered and the car responds to such calls automatically, unless otherwise controlled by the operator or dispatcher.

## Preliminary Plan Data

The main factors influencing the type of equipment required are:—

- 1—The size of the building;
- 2—The purpose for which the building is intended;
- 3—Location in the city;

and while every building must be made a study in itself, the following table may be of assistance in preparing preliminary plans:—

Type of Building.	Floors.	Speed in F.P.M.	Capacity in lbs.	Desirable Control	Desirable Operation.
Office Buildings . . . . .	10/15	450/600	2,000/2,500	V.V.	CSW. AL.
Office Buildings . . . . .	6/10	350/450	2,000/3,000	V.V.	CSW. AL.
Office Buildings . . . . .	0/6	300	2,000/3,000	Rheo.	CSW.
Professional Chambers . . . .	4/10	300/450	1,500/2,500	V.V.	Dual
Department Stores . . . . .	3/8	300/450	2,500/4,000	V.V.	CSW. AL. Special
Hospital (Passenger) . . . . .		200/300	1,500/2,500	Rheo.	Dual
Hospital (Stretcher) . . . . .		200	1,500/2,000	V.V.	G.S. Anti-Creeping
Hotels . . . . .	4/10	300/350	2,000/2,500	V.V.	CSW. AL.
Flats . . . . .	4/10	200/350	1,500/2,000	Rheo.	Coll.
Factory (Passenger) . . . . .	3/7	200/350	1,500/2,500	Rheo.	Dual
Factory (Goods) . . . . .	3/7	100/300	4,000/20,000	Rheo.	CSW.

V.V.—Variable voltage or motor generator control.  
Rheo.—Rheostatic or series resistance control.  
CSW.—Car switch operation by an attendant.

AL.—Automatic inductor landing.  
Dual.—Car switch or alternatively push button operation.  
Coll.—Automatic collector or multi call operation.



# THE AUSTRALIAN GENERAL ELECTRIC Co. Ltd.

33b

S.A.A. File No.

N.S.W.—The Australian General Electric Co. Ltd., 95 Clarence Street, Sydney; and at Keen Street, Lismore; 53 King Street, Newcastle.

VICTORIA—The Australian General Electric Co. Ltd., 108 Queen Street, Melbourne; and at Dean Street, Albury; 197 Whitehorse Road, Box Hill; Murray Street, Colac; Johnson Street, Maffra.

S.A.—The Australian General Electric Co. Ltd., 27 Grenfell Street, Adelaide.

QUEENSLAND—The Australian General Electric Co. Ltd., cr. Queen and Adelaide Streets (Petrie's Bight), Brisbane; and at 158 East Street, Rockhampton; Flinders Street East, Townsville.

W.A.—Agents:—Messrs. Atkins (W.A.) Ltd., 894 Hay Street, Perth.

TASMANIA—Agents:—Messrs. Oliver and Oliver Pty. Ltd., 9 Argyle Street, Hobart; and at Quadrant, Launceston.



## A.G.E. Motors for Elevators

The Australian General Electric Company furnishes the following classes of Electrical Apparatus for Elevator Installations:—

(1) Single speed, alternating-current motors, either squirrel cage or slip ring construction, complete with control. These are used with geared elevators having a speed up to 150 ft. per minute.

(2) Multi-speed, alternating-current motors having a speed ratio of 2:1, and being of the squirrel cage type, complete with control. These are used with geared elevators having a speed up to 350 ft. per minute.

(3) Multi-speed, alternating-current motors having a speed ratio of 3:1, and comprising a squirrel cage and slip ring motor, electrically independent of each other, but mounted on the same shaft. Control is also furnished. These are used with geared elevators having a speed of from 350 to 500 ft. per minute.

(4) Single-speed, direct-current motors with rheostatic control, for use on geared elevators having speeds up to 200 ft. per minute.

(5) Adjustable speed, direct-current motors, with rheostatic control, for use on geared elevators having a speed from 200 to 500 ft. per minute.

(6) Direct-current motors with variable voltage control, for use with geared elevators having a speed up to 500 ft. per minute.

(7) Gearless elevator motors with rheostatic control, for elevators having a speed of 600 ft. per minute.

(8) Gearless elevator motors with variable voltage control for elevators having a speed from 500 to 700 ft. per minute.

(9) A.C. Variable Speed Motor: The British Thomson-Houston Co. have developed an A.C. motor, the speed of which can be varied over a range of 8 or 9:1 by moving the brushes on the commutator, which is done by means of a pilot motor. This motor can be used on geared elevators, and gives an installation which is comparable to the geared variable voltage equipment in performance, but lower in first cost.

All electrical equipment furnished by the Australian General Electric Company for elevator service has been specially designed to meet the exacting requirements of this service. The application of particular apparatus is made by elevator manufacturers after consultation with Australian General Electric Company engineers.

**GEARED ELEVATORS.**—Geared Elevators utilise motors having a maximum speed of between 600 and 1,200 r.p.m. Mechanical gearing, usually of the worm and gear type, is used to reduce the speed at the rope sheave shaft to the required speed. About 500 ft. per minute elevator speed is the maximum for geared elevators.

**GEARLESS ELEVATORS.**—Gearless Elevators utilise motors having a maximum speed of about 65 r.p.m. No reducing gears are used with this type, the rope sheave being mounted

directly on the motor shaft and revolving at the same speed as the motor. A direct-current motor must be used for this class of elevators. The gearless elevator is used when the elevator speed is above 500 ft. per minute; occasionally below this speed.

## A.G.E. Control for Elevator Motors

The Australian General Electric Company offers two types of control for elevator service: (1) rheostatic control, (2) variable voltage control. Rheostatic control has been used with electric elevators since their inception. Variable voltage control is comparatively new as applied to elevators, but the basic principle (Ward-Leonard control) is old.

**RHEOSTATIC CONTROL.**—Rheostatic. Control utilises external resistance in the armature circuit of the motor, this resistance being inserted or cut out of the circuit by contactors. The amount of resistance in circuit determines the voltage applied across the motor, and thus the motor speed.

**VARIABLE VOLTAGE CONTROL.**—Variable Voltage Control utilises a motor-generator for each elevator, the generator being electrically connected to the elevator motor. The generator is of the direct-current type, and its voltage is varied by means of an external resistance in the field circuit. The amount of resistance in circuit is controlled by the car switch. The speed of the elevator, which is driven by a direct-current motor, depends on the voltage generated by the generator.

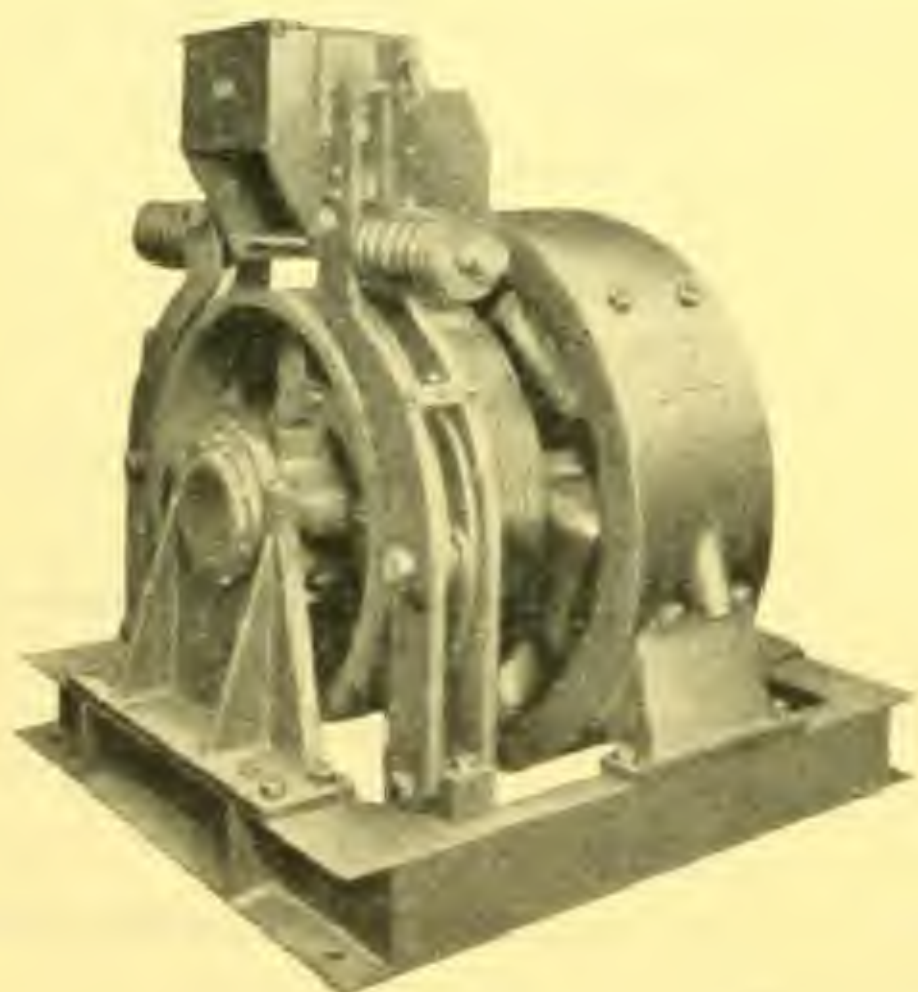
Variable voltage control may be used when either alternating-current or direct-current power supply is available, as the motor-generator set may have either an alternating-current or a direct-current motor, driving the generator.

The speed regulator, as furnished by the A.G.E. Co. Ltd., with variable voltage control, is an important feature. The speed regulator forms a part of the motor-generator set, and is used to compensate for the inherent regulation of the elevator motor and the motor-generator set. By this device, a practically uniform elevator speed is obtained with all conditions of loading and in both directions of travel. The speed regulator can also be adjusted at the low speed condition of the elevator so as to ensure a lower car speed when a full load is being lowered than when a full load is being hoisted. This makes accurate floor stops easy for the operator.

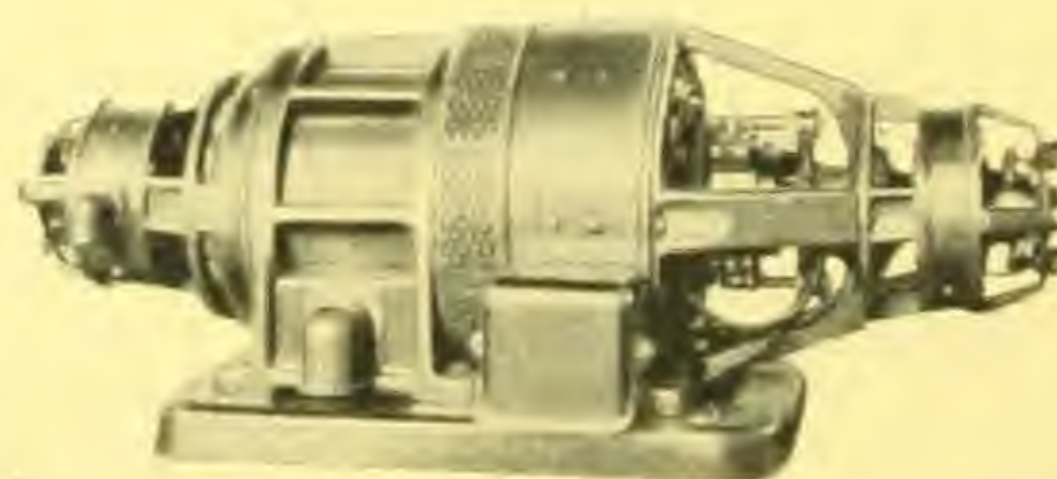
The chief advantages of variable voltage control over rheostatic control are:—

- (1) Smooth acceleration and retardation
- (2) Lower cost of maintenance.
- (3) Lower power consumption.
- (4) Greater service in handling traffic.

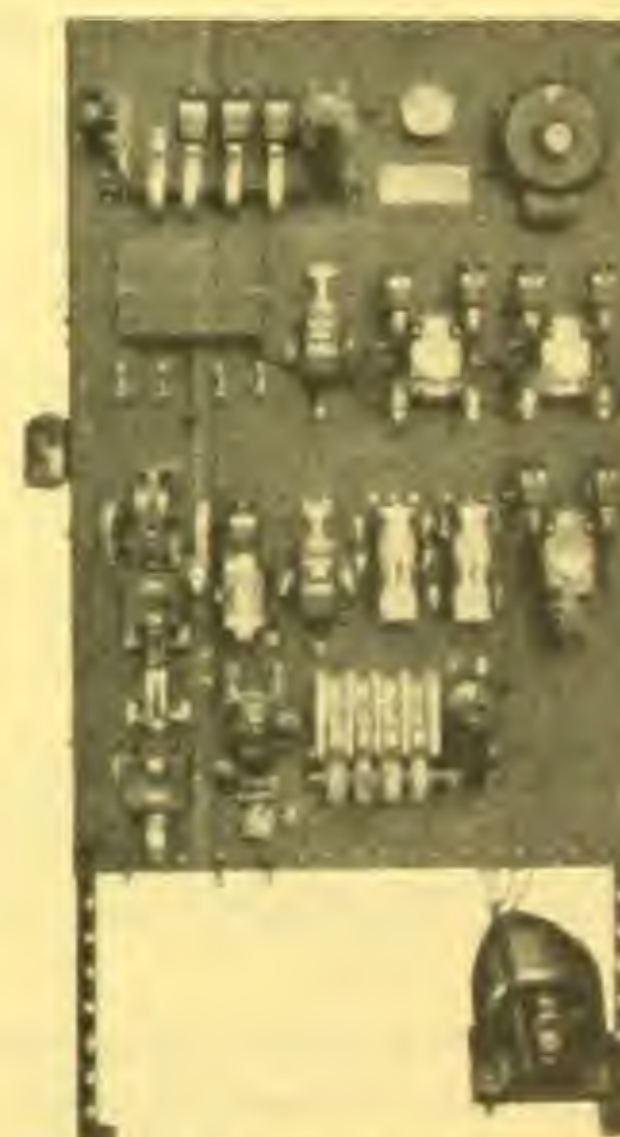
Due to the higher rates of acceleration and retardation to a given speed with variable voltage control, the time required to travel a given distance is reduced, and thus the mileage obtained during the day is increased. This, of course, reduces the round trip time of the elevator, which increases the service.



Gearless Traction Motor and Machine.



Motor-Generator Set for Variable Voltage System.



Control Panel for Variable Voltage System.

A.G.E. GEARLESS ELEVATOR EQUIPMENT.



## WAYGOOD OTIS (AUST.) PTY. LTD.

HEAD OFFICE & WORKS: HAYES ROAD & DUNNING AVENUE, WATERLOO, N.S.W.  
Telegrams: Lyndentree, Sydney.

### BRANCH OFFICES AND SERVICE STATIONS:

MELBOURNE: 80 Queen's Bridge Street,  
South Melbourne.  
Telegrams: Waygotis, Melbourne.

BRISBANE: Albert House, Albert Street.  
Telegrams: Lyndentree, Brisbane.

NEWCASTLE: Tyrill House, Telford Street.

ADELAIDE: 7 Twin Street.  
Telegrams: Lyndentree, Adelaide.

PERTH: 383-7 Murray Street.  
Telegrams: Lyndentree, Perth.

### ASSOCIATED COMPANIES:

Waygood-Otis Ltd., London.

Waygood-Otis (N.Z.) Ltd., Wellington, N.Z.

Waygood-Otis (S.A.) Ltd., Durban S. Africa.

Otis Elevator Company, New York.

And Offices in the Chief Cities throughout the World.

33a

S.A.A. File No.

LIFTS

### Products

Electric Lifts or Elevators for Passengers, Goods and Service; Escalators; Mail Chutes; Doors and Enclosures; Lift Cars; Door Closers; Lift Position Indicators; Signals and Accessories. Lift Service and Repairs.

### Planning Service

The laying out and deciding upon an elevator system in a modern building is one of the most important items with which the architect has to deal, and one which will vitally affect the success of the building as an investment. In more than seventy-five years of manufacture and installation of elevators, the Waygood-Otis organisation has accumulated a vast amount of data as to elevator performances and requirements for buildings of various types and heights. We are glad indeed to place all of this information at the disposal of the architects and owners, and will, without cost, submit recommendations for elevator equipment in proposed buildings. Our nearest branch office is at your service at any time.



### Design and Manufacture

All Waygood-Otis Machines, Motors, Controllers, Safety Devices, and other apparatus are manufactured in their entirety in Waygood-Otis factories and from Waygood-Otis designs, which are the result of years of experience. The Waygood-Otis elevator is, therefore, not an assembly of non-related parts, but of parts

which are so designed and constructed as to operate together as a unit.

### Elevator Accessory Apparatus

We are now offering a complete line of elevator accessory apparatus and appliances. These are all made in Waygood-Otis factories with the same care and under the same supervision and high standards of workmanship as are the elevator machines. This ensures to the purchaser appliances manufactured particularly for the machines with which they are to be used, and, therefore, more efficient than ordinary commercial parts assembled with other makes of apparatus.

### Waygood-Otis Service

To derive the fullest possible benefit from any installation of Waygood-Otis elevators, it is essential that the machines be properly maintained; otherwise, they will not provide the high class of service of which they are capable.

We are prepared to take care of machines under many forms of Waygood-Otis Service. This includes a regular examination, oiling and cleaning of the apparatus at stated intervals, and advising the owner or



View of Main Bay, Waterloo Works.

tenant of matters that should have attention. Other services include, not only the examination of the apparatus, but also the replacement of worn parts.

### Maintenance

Under Waygood-Otis Maintenance Service we assume full care of the machine, making regular examinations and adjustments, furnishing all parts required for replacement, including ropes and any of the larger wearing parts, at a stipulated sum per year.

(Continued on next page)



## ELECTRIC ELEVATORS

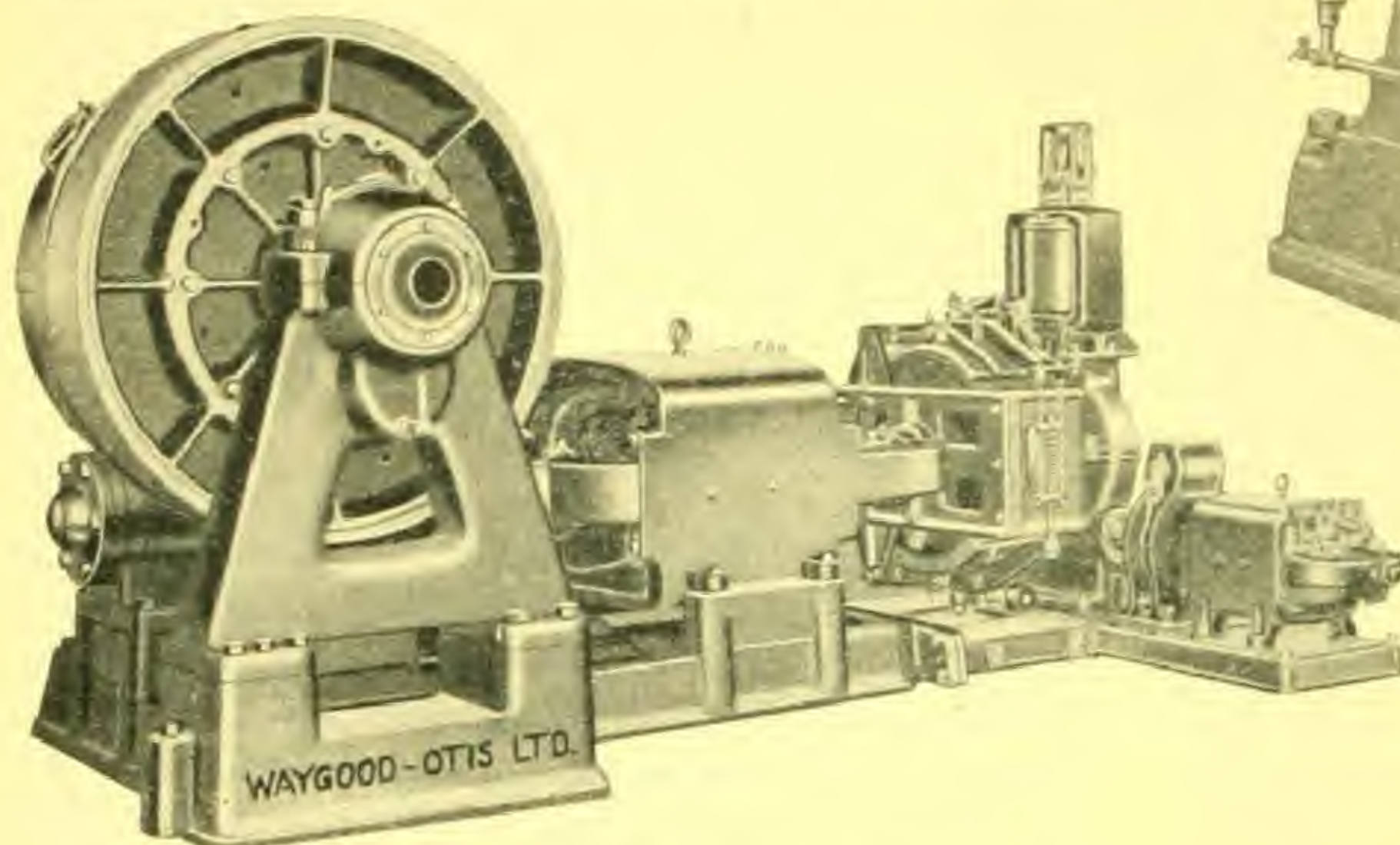
## Types

Electric Elevators as now installed are divided into two classes: the single wrap or geared traction, and the gearless traction. The single wrap traction has superseded the old drum type, as it is much more efficient and has the inherent safety feature of traction drive. The gearless traction type of elevator is used exclusively for the higher speeds and for the highest class of service.

## Single Wrap Geared Traction Elevators

On this type of elevator the car is driven through a driving sheave, operated through worm-gearing by a motor of 700 to 900 rev. per minute. Car speeds range up to 400 feet per minute.

This type of machine is generally used for freight work and for moderate passenger requirements where conditions of rise, load, speed, and required service would not warrant the use of the higher grade gearless elevator.



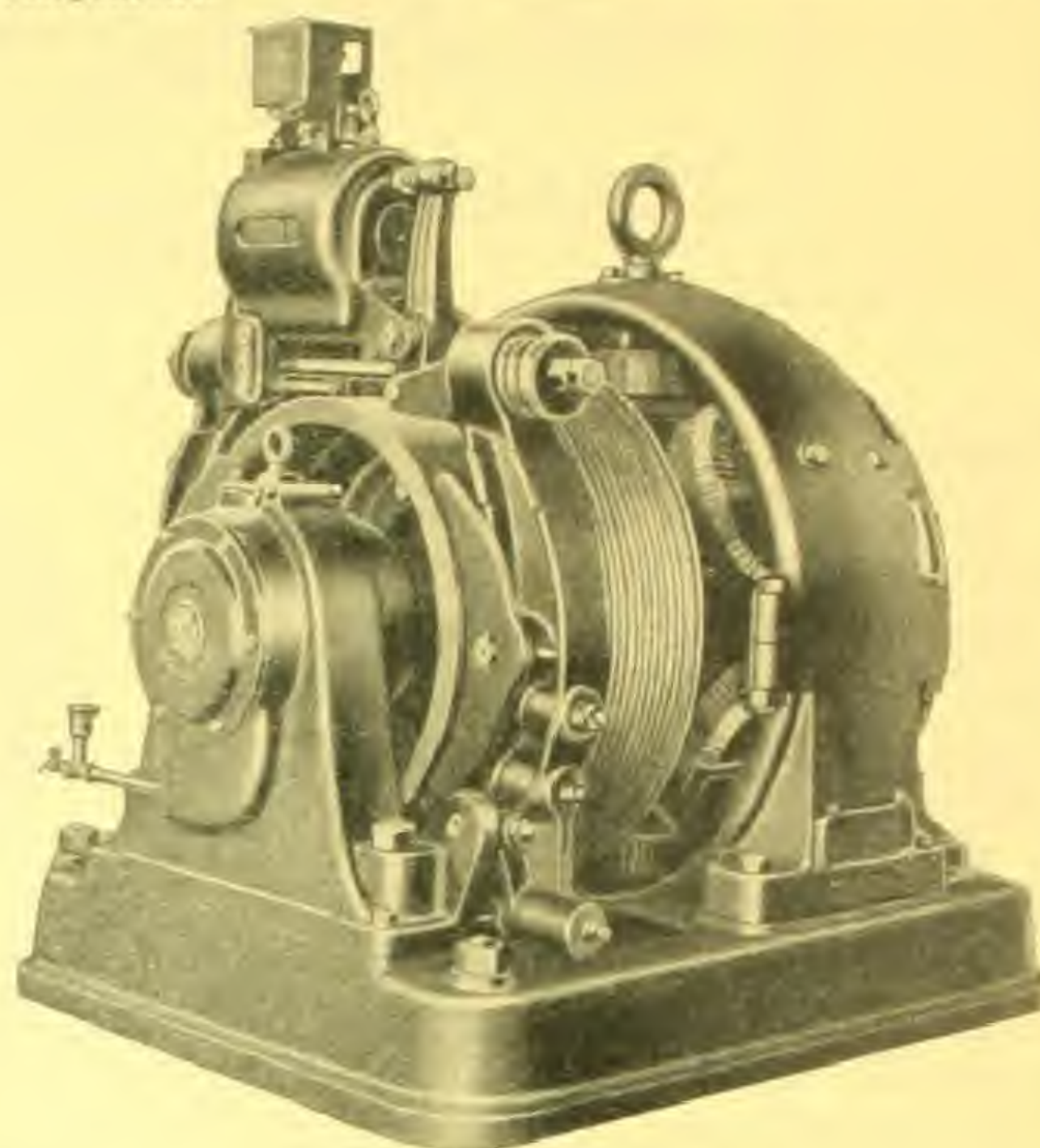
Geared Micro-Drive Traction Machine.

## Gearless Traction Elevators

The gearless traction elevator is the highest development of the electric elevator, and provides car speeds up to 900 feet per minute. This type of elevator employs a slow-speed high-torque motor, with a driving sheave mounted on a spider, which is integral with the armature shaft. All intermediate gearing is thus eliminated, as the slow-speed motor enables the car to be driven directly from the sheave, by means of ropes which pass around the sheave, and then to the car and the counter-weight.

Rapid and smooth operation, starting and stopping, and very high efficiency are features of this machine.

In cases where larger capacities at more moderate car speeds are required, this type of machine can still be utilised by roping the car and counter-weight on a 2 : 1 arrangement.



Gearless Traction Machine.

## Micro-Levelling Elevators

Increased demands for higher efficiency in elevator service, for both high-speed passenger and heavy-duty freight elevators, have been met by Waygood-Otis in the Micro-Levelling Electric Elevator, with either car switch or automatic control, and of either the gearless traction or geared traction type.

When the car reaches the micro zone for the floor where it is intended to stop, the car is automatically brought level with this landing, irrespective of load and speed, and also maintains the platform at that level, regardless of changes in the load on the platform or stretch of ropes. All this levelling operation is performed entirely automatically and independently of the operator.

This eliminates the stumbling hazard on passenger elevators, and obviates the possibility of damage to goods or trucks so often caused by uneven levels when loading and unloading freight elevators. It eliminates false stops at the floors, thus saving time in transferring passengers or freight, and increasing the quantity and quality of service. It reduces the cost of current; saves wear and tear on the apparatus, and prolongs its life.

## ESCALATORS

## Escalators or Moving Stairways

Used wherever it is desired to move people in great numbers continuously and rapidly. They may be made reversible so as to conform to the changes in flow of traffic during the day, and can be installed for both up and down service. They operate continuously, with no waiting interval, and carry large numbers of people comfortably, quickly, and without exertion. They require

small motors on account of being constant-running, hence the operating cost is very low.

Waygood-Otis Escalators are made in three sizes:—	
Distance between balustrading.	Capacity per hour.
2 feet	4,000
3 feet	6,000
4 feet	8,000

Angle of inclination—30 deg.

Consult us early to ensure correct position of floor beams.

(Continued on next page)



## CONTROL SYSTEMS FOR ELECTRIC ELEVATORS

## Car Switch Control

The most generally used form of control is the switch in the car operated by an attendant—the control being a self-centring handle.

## Automatic Push Button

This type of control meets, with full safety, the requirements of service without an attendant. Call buttons at each landing and a full set of operating buttons in the car provide for the operation. The design is such that the landing buttons are rendered inoperative immediately the passenger enters the car.

## Dual Control

Dual control combines "Car Switch" and "Automatic Push Button"—one control at a time being available.

## Double Button

This control consists of up and down buttons in the car and at each floor. Constant pressure will call the car to any floor, if the gates are closed and it is not already in use, and pressure upon either button in the car will cause the car to travel in the desired direction. This form is only used for goods service.

## Department Store Control

This control embodies power-operated doors and self-levelling, with automatic starting and stopping of the lift at each floor, unless the operator desires to pass a floor, in which case he holds his switch to the "Pull on" position. The centring of the switch after passing a floor causes the lift to automatically slow down and stop at the next landing.

## Flying Stop Control

This is a form of car switch control in which the slowing down and stopping at a floor at the exact level is carried out automatically in the minimum time, irrespective of the operator. The stop may be initiated at any moment after passing a floor, when the correct stopping at the next floor will be automatically obtained.

## Collective Automatic Control

Collective Automatic Control is a variation of the Automatic Push Button and is used for intensive service in buildings where it is desired to dispense with the services of an operator. The elevator is operated by the passengers themselves, who press buttons in the cars indicating the floors to which they wish to travel. Passengers on the floors call the car by means of pressing buttons indicating the direction in which they wish to travel. With this type of control, the elevator automatically answers all signals from waiting passengers in the direction in which it is travelling. This type of elevator may be installed for traffic conditions where it is desired to dispense with the operators, and car speeds up to 600 feet per minute are available under these conditions. Micro-levelling may also be supplied for any duties with this control, except the smaller capacities at slow speeds.

## Automatic Signal Control

Automatic Signal Control, with which is combined Micro-levelling and Unit Multi-Voltage Operation, and Power-Operated Doors, provides the highest class of intensive service. The elevator is operated by means of buttons in the car to correspond to the floors served, and "up" and "down" buttons outside the hatchway at each floor. With this form of control, the attendant merely presses buttons in the car indicating the floors at which passengers wish to alight. When the attendant releases the hatchway doors in leaving the main floor, or in discharging and receiving passengers, at other floors, the doors close automatically, the car immediately starts automatically and

runs to the next floor for which a button has been pressed, where it stops automatically, and the door opens automatically, this cycle being repeated for all floors for which there are passengers. Intending passengers press buttons on the floors, indicating the direction in which they wish to travel. This call is then registered directly on the controller of the first elevator travelling in the desired direction. This car then stops automatically at the floor.

## Multi-Voltage Control

This employs a motor generator for supplying the current from the mains to the lift motor at the maximum rate without losses in starting resistances, etc. This type of control produces the fastest rate of acceleration and retardation, and without discomfort to the passengers. It permits higher car speeds, smoother operation; handles more passengers per hour, and consequently reduces the number of elevators required, and is economical in power consumption, and for busy lifts is economical in power consumption.

Multi-voltage control can be applied to most of the control systems described on this page.

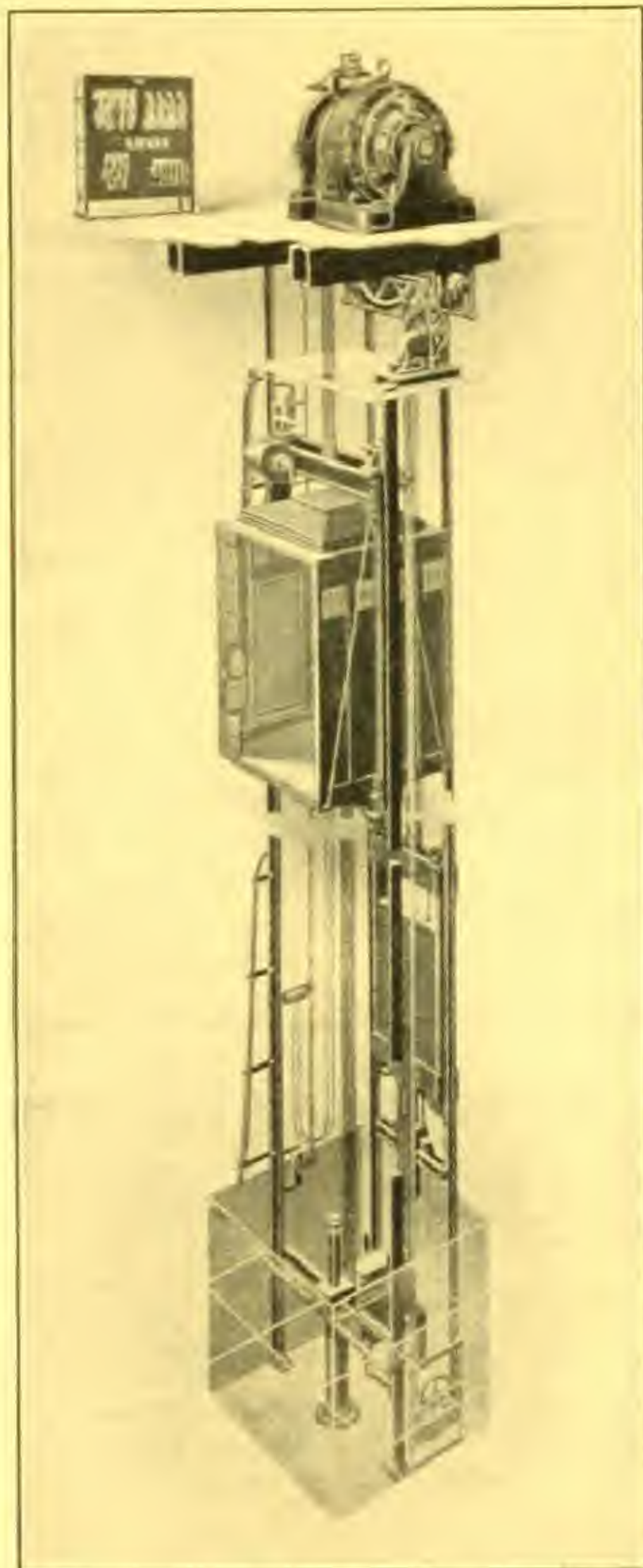


Illustration of Assembled Lift Equipment.

## AUXILIARY APPARATUS

**Door Closers.**—We are also offering various types of the appliances for the differing conditions for which they will be used.

**Signal Equipment.**—The Waygood-Otis Company is now offering Waygood-Otis Signals of all types, which are also distinctively Waygood-Otis in manufacture, embodying the same high standard of workmanship and materials as Waygood-Otis Elevators. The design and operation of these Signals are the result of the thorough knowledge of the requirements of elevator service, and they are built to perform as an integral and co-ordinate part of the elevator and signal equipment.

Signal fixtures for both car and corridor are of new and artistic designs and finishes. The principal systems are the Hall Light and Car Signal System, and also the Hall Light and Car Annunciator Signal System. Additional features include scheduling devices, car position indicators, electrical and mechanical dial indicators and starters' panels.

**Electric Door Operators.**—Waygood-Otis Electric Door Operators are now available for the automatic operation of hatchway doors and are being extensively used in place of pneumatic door operating systems which have heretofore been exclusively used.

**Electric Dumbwaiters** are available in different forms of control, as required for various types of service. These machines are of a new and improved design, manufactured in Waygood-Otis factories with all the care and precision used in the highest class of elevator machinery.

(Continued on next page)



## LIFT DESIGNING DATA

(FOR PRELIMINARY DESIGN ONLY)

### General Consideration

In seeking to answer the frequent enquiry: "Given the dimension of the land and the number of stories, how many elevators, and of what capacity, will be required for this building?" experience shows that this presents quite an involved problem, which can only be referred to here in a general way, as it is not possible to formulate any hard and fast rules which would adequately cover all conditions encountered. It is frequently found on large installations that several alternative combinations of different equipments would give approximately equal service. The following data, therefore, is only approximate and should only be used when considering the problem in its early stages.

### Number and Size

The number and size of elevators is governed by many considerations as: (1) character of building, (2) height of building, (3) rentable area, (4) average number and lengths of stops per trip, (5) speed and type of elevator used. The square feet of net rentable area per person in office buildings usually varies between 60 and 135—100 square feet is the usual density for an office building having a large number of small offices. For the allowable area of floor per person in factories, hospitals, assembly rooms, etc., consult the Board of Health Regulations. The basis for deciding the car area is to allow two square feet per passenger and four square feet for attendant. Weight of passengers calculated at approximately 150 lbs. each. Cars should be arranged with the width greater than the depth to facilitate quick loading and unloading, and deep, narrow cars are objectionable at all times. A standard office building lift car is one of 2,500 pounds capacity; these passenger cars should be about five feet or a little less in depth. Minimum height of cars inside—seven feet.

### Arrangement of Entrances, Hatchways, Motor Room

Two entrances and corner guides are to be avoided, if possible.

The type of door should be such that ingress and egress will be free as possible—usually 65 per cent. of the width of the car—in order to provide standing room for the attendant.

For automatic passenger lifts, single sliding doors, 2 ft. 9 in. wide, are usually fitted. These must be provided with glass or wire panel to give vision of car from landing.

When two or more lifts are placed side to side, wide cars result in the machines being spaced further apart, a very desirable position, particularly with large machine-room equipment.

Machine-rooms should be well ventilated, light, and clean as possible. Where machines have heavy parts which it may be necessary to remove from time to time for inspection, it is advisable to locate a beam with hand-hoist above them to facilitate handling.

### Size of Motor Room

Motor-room sizes vary considerably according to the equipments to be accommodated, and the layout conditions of each installation must be considered separately. For each equipment, actual requirements should be obtained from the Lift Engineers, as this ensures adequate space being made available in the correct position. With gearless machines, a secondary floor over well-hole, four feet below main motor-room floor, is highly desirable and mostly essential. Overrun requirements are governed by the speed and are constant, as shown in the accompanying drawing.

## SPEEDS

The following speeds of lifts are considered standard practice—

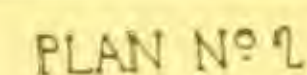
Type of Service.	Speed in F.P.M.	Type of Service.	Speed in F.P.M.
Short rise, heavy goods hoists .....	50	Flats above five floors .....	250
Offices, warehouses, stores, five stories and under— not intensive service .....	200	Department stores, floor to floor service—slow service ..	200
Offices, warehouses, stores, five stories and under— intensive service .....	300	Department stores, floor to floor service—intensive service .....	400
Flats up to five floors .....	125	Offices, 6-8 floors—intensive service .....	400
		Offices, 8-12 floors—intensive service .....	600

## LIST OF TYPICAL INSTALLATIONS

David Jones Ltd., Sydney. Associate Architects: H. E. Budden and E. H. Mackellar.	State Bank, Adelaide. Architects: Davies, Wooldridge & Counsell.
Farmer & Co. Ltd., Sydney. Architects: Robertson & Marks. Engineers: W. D. Watson & White.	Adelaide Electric Supply Co. Architects: McMichael & Harris.
Bank of N.S.W., Sydney. Architects: Robertson & Marks. Engineers: W. D. Watson & White.	Masonic Temple, Adelaide. Architects: Bruce & Harral.
Mark Foy's Ltd., Sydney. Architects: Ross & Rowe.	T. & G. Building, Adelaide. Architects: A. & K. Henderson.
Government Savings Bank, Sydney. Architects: Ross & Rowe.	Colonial Mutual Building, Brisbane. Architects: Hennessy & Hennessy, Engineer: H. A. Rorke.
"Herald" Building, Sydney. Architect: F. Clatworthy.	T. & G. Building, Brisbane. Architects: A. & K. Henderson.
"Sun" Building, Sydney. Architect: J. Kethel. Engineers: Julius Poole & Gibson.	Ascot Chambers, Brisbane. Architects: Hall & Prentice.
T. & G. Buildings, Sydney and Melbourne. Architects: A. & K. Henderson.	Alliance Assurance Co., Brisbane. Architect: J. A. Kethel.
Wingello House, Sydney. Architects: John Reid & Sons.	Royal Exchange Assurance Co., Brisbane. Architect: J. A. Kethel.
Murdoch's Ltd., Sydney. Architects: Power, Adam & Manning. Engineer: H. A. Rorke.	Bank of Australasia, Brisbane. Architects: A. & K. Henderson.
Colonial Mutual Buildings, Sydney and Melbourne. Architects: Hennessy & Hennessy. Engineer: H. A. Rorke.	Commonwealth Bank, Brisbane. Architects: Commonwealth Works & Railways Department.
Science House, Sydney. Architects: Peddle, Thorpe & Walker.	Craigston Flats, Brisbane. Architects: Atkinson, Powell and Conrad.
Stanton House, Sydney. Architect: H. E. White.	Atcherley House, Brisbane. Architects: Atkinson, Powell and Conrad.
Hotel Alexander, Melbourne. Architect: Leslie M. Perrott.	Heindorfs Ltd., Brisbane. Architect: E. P. Trewern.
National Bank, Melbourne. Architects: A. & K. Henderson.	McWhirter's Ltd., Brisbane. Architects: Hall & Phillips.
Bank of Australasia, Melbourne. Architects: A. & K. Henderson.	Yorkshire House, Perth. Architect: F. H. B. Hawkins.
A.P.A. Building, Melbourne. Architects: Moresby & Coates.	Chenel House, Perth. Architects: Eales, Cohen & Bennett.
Howey Court, Melbourne. Architect: Marcus Barlow.	Royal Insurance Co., Perth. Architects: Hobbs, Smith & Forbes.
The Strand, Melbourne. Architects: Peck & Kempter.	Goldsbrough, Mort & Co., Perth. Architects: Hobbs, Smith & Forbes.
Mutual Stores, Melbourne. Architect: Cedric H. Ballantyne.	Bank of Adelaide, Perth. Architects: Hobbs, Smith & Forbes.
Shell Building, Adelaide. Architects: McMichael & Harris.	Goode, Durant & Co., Perth. Architects: Hobbs, Smith & Forbes.

(Continued on next page)





X INDICATES MAXIMUM DISTANCE BETWEEN CENTRE LINES OF CAR AND BALANCE WEIGHT WITHOUT USING A DIVERTING SHEAVE.  
F INDICATES SPACE REQUIRED FOR DIVERTING SHEAVE WHEN X IS EXCEEDED.  
G INDICATES SPACE REQUIRED FOR PLAN NO.1 WHEN NO DIVERTING SHEAVE IS USED.  
H INDICATES SPACE REQUIRED FOR PLAN NO.1 WHEN NO DIVERTING SHEAVE IS USED.  
\* WHERE NO INDICATION IS GIVEN AS TO WHETHER A.C. OR D.C. SAME CONDITIONS APPLY FOR EITHER SUPPLY.  
NOTE OVER-RUN DIMENSIONS C SHOULD BE CONFIRMED FOR EACH INSTALLATION AS PRESENT STATE REGULATIONS VARY.

DRAWING  
No 1.  
8<sup>TH</sup> APR. '31



## ARCHITECT'S SPECIFICATION

## TYPE AND LOCATION

The equipment shall be a..... (state whether geared traction or gearless traction) lift installed in accordance with the following details and consisting of (1) electric passenger/goods lift in building located at.....

## DIMENSIONS AND TRAVEL

The size of the car shall be about ..... wide x ..... front to back and shall be arranged with ..... opening(s) located ..... The car shall travel from the ..... to ..... floor, about ..... feet, stopping at ..... floors and serving ..... openings.

## LOAD AND SPEED

The lift shall lift a load of ..... lbs., in addition to the weight of the car, at a speed of ..... feet per minute. The motor shall operate on a power circuit of ..... volts, ..... (direct or alternating) current (if alternating current, state phase and cycles).

## CAR PLATFORM AND ENCLOSURE

The car platform shall be made of selected well-seasoned hardwood, set in a steel frame securely fastened and braced to the car frame. The car enclosure shall be built of wood to design as approved by the Architect, and shall be of a P.C. value of ..... including folding gate (omit if not required by authorities) and suitable light fixture. Supply switch and connect light to outlet point at centre of hatchway.

## OPERATING DEVICE—(Car Switch or Dual Control)

The operating device provided in the car shall consist of (1) a series of push buttons and/or (2) a switch or (3) (especially described—see data on Control Systems) giving the attendant complete control of the operating mechanism and brake, as hereinafter described; or

## OPERATING DEVICE—(Push Button Control)

The lift shall be operated from the car by means of a series of push buttons, numbered to correspond to the various landings; in addition to these buttons there shall be placed in each car a safety button, the operation of which shall stop the car at any point in its travel.

There shall also be provided outside each enclosure door, a push button, the momentary pressing of which will bring the car to the landing unless the lift is in use.

The control shall give the passenger in the car complete control of the operating mechanism and brake, as hereinafter described.

## ANNUNCIATORS—INDICATORS (Car Switch or Dual Control)

(a) An electric annunciator having (up-down) push button at each landing, shall be provided under this contract. The annunciator shall consist of a single (double) row of drops numbered to correspond to the floors served; or (b) An automatically re-setting electric annunciator, having up-down push buttons at each landing, shall be provided. The annunciator shall consist of a double row of drops—one for up and one for down—numbered to correspond to the floors served, and the pressing of an up or down button on any floor will record on the annunciator the floor calling and direction of travel desired.

The stopping of the car at a floor will automatically reset the call for that direction on the annunciator, and all calls for both directions will remain recorded until reset by the car responding to the call.

If two or three cars.—The annunciators in each car will be cross-connected and operated from only one set of hall buttons, and the stopping of any one car at a floor will automatically reset the annunciators in each car for that floor and direction.

(c) Alternative system for two or more cars.—A complete flashlight annunciator signal system shall be provided. This shall consist of a flashlight annunciator in each car having a double row of flashlights—one for up and one for down—numbered to correspond to the floors served, and cross-connected so as to operate from only one set of up-down push buttons on the landings. The pressing of an up or down button on any floor will record on the annunciators in each car the floor calling and direction of travel desired, and the stopping of any one car will automatically reset the annunciators in each car for that floor and direction. In addition, flashlight signal lanterns shall be provided on the landings over each doorway, arranged to illuminate with a white light for the up and a red light for the down direction immediately the corresponding car has commenced to slow down before stopping at the floor.

## ROPES

The lift shall be provided with best quality hoisting ropes, attached to the car and counter-weight by spring hitch or other approved equaliser.

Number of ropes to be stated in tender.

## ROPE COMPENSATION — (For Gearless Traction Machines or for Geared Machines where travel exceeds 125 feet)

The varying weight of the hoisting ropes, due to the changing location of the car, shall be compensated by ropes attached to the bottom of the car and the counter-weight and running under an idler sheave, in a compensating frame in the pit.

## BUFFERS

Suitable Spring Buffers shall be fitted beneath both car and counter-weight (if speed of lift is greater than 300 feet per minute, Oil Buffers to be provided).

## GUIDES

Planned steel tee guides shall be furnished for the car and counter-weight, and fixed to walls, trimmers, or other supports provided by owner.

## FOUNDATION

The machine shall be placed over the hatchway upon steel beams furnished in place under this contract upon supports provided by others. The concrete floor under the machine (and the secondary floor slab—"for gearless machines only") shall be provided by others.

## MACHINE AND MOTOR

The machine shall be of the Waygood-Otis single wrap, geared traction type (or gearless traction type), or approved equal, of the highest efficiency, with the traction driving sheave, gearing (omit "gearing" for gearless type), motors and brake, mounted on a heavy continuous cast-iron bed plate. The motor shall be of Waygood-Otis design for use with traction machine (or gearless machine) or approved equal, developing high starting torque, with low starting current, and built to meet fully the exacting requirements of modern lift service.

Note.—Details of motors and machines and controllers not covered in the specification, shall be submitted by the sub-contractor before contract is let.

## MICRO DRIVE

There shall be provided a micro self-levelling device which will definitely ensure the car stopping and being maintained level with the floor under all conditions of loading, so arranged that the car will not stop short of the landing or will immediately return to the landing in the event of over-running same.

The self-levelling device shall ensure that the car shall be brought to the landing in the shortest possible time, irrespective of operating conditions, and shall permit of the doors being opened while the car is levelling.

The micro drive shall be accomplished either by the main motor or an auxiliary motor and gear, and full details on this point, together with the method of operation to be employed, shall be submitted by the sub-contractor with tender.

## CONTROLLER

The Controller shall be of the Electro-Magnet type, designed for use with the machine specified above, and operated by push buttons in car and at floor landing (or by switch). In the case of alternating current supply the controller shall be fitted with reverse phase relay to cut off current in the event of reversal of phases or failure of supply.

## COUNTER-BALANCE

The lift shall be provided with suitable counter-balance for smooth and economical operation.

## SAFETY DEVICES

The following safety devices shall be provided for, whether required by lift authorities or not:—

Car safety gear and centrifugal speed governor.

Automatic limitation or stopping switch.

Safety door-locking device to prevent the lift being started unless all doors are closed, and to prevent the opening of any doors unless the lift is opposite same.

## ELECTRIC POWER CONNECTION

Connection from the power mains, including an overload circuit breaker at a point adjacent to the lift controller, shall be supplied by others, together with all other safety devices required by local electric supply authorities. The light outlet at centre of hatchway shall be provided by others.

## PREPARATORY WORK

The following preparatory work shall not be included in this contract:—

Preparation of a legal hatchway, including extension above roof level, and pits of proper legal depth.

The housing and preparatory foundations for all machines.

Hatchway enclosures, doors, gates, etc.; supports for guide posts.

All electric power necessary for the machinery, testing, etc., shall be supplied by the owner.



# CHUBB'S AUSTRALIAN COMPANY LTD.

With Which is Incorporated  
**RICHARD BROTHERS**  
*Art Metal Workers*

164 CLARENCE STREET, SYDNEY. 120 QUEEN STREET, MELBOURNE.  
 Works at ELIZABETH STREET, WATERLOO, SYDNEY.

## Agencies At:

BRISBANE: James Campbell & Sons Ltd. ADELAIDE: Burns, Philp & Co. Ltd.  
 PERTH: Harris, Scarfe & Sandovers Ltd. HOBART: Charles Davis Ltd.  
 WELLINGTON, N.Z.: A. C. Gillies & Laird Ltd.

33g

S.A.A. File No.

REGISTERED  
 TRADE



MARK

MADE IN AUSTRALIA

## PRODUCTS

Two-speed, Bi-parting, and Single Sliding Hollow Metal Lift Doors; Chubb Patent Lift Door Closers and Oil Checks; Pressed Metal Lift Cars; Hollow Metal Office Doors and Partitions; Pressed Metal Jambs, Architraves, and Skirtings; Wrought-Iron Entrance Gates; Wrought-Iron Balustrading; Collapsible Gates; Strongrooms; Safe Deposits; Reinforcements for Strongrooms; Strongroom Doors; Safes; Steel Grilles; Steel Shelving; Locks.

**Chubb's Two-speed Lift Doors** give a wide opening for traffic, whilst effecting a definite economy of space in the Lift Well. The Doors require considerably less space in the recess than any other type, e.g., Two-speed Doors giving a traffic opening 4 ft. wide, slide back into a recess space of only 2 ft. 5½ in., which accommodates Doors, Controller and Oil Check. See Drawings R.5371, page 459.

**Hollow Metal Fire-resisting Doors** are constructed with 18-gauge ingot iron base furniture steel, sleeved with slab cork, and all joints are interlocked and welded, thus preventing any warping or twisting of doors, or breaking of joints. Doors are internally reinforced to stand up to heavy wear and tear.

**The Unity Frame** is specially designed to give a rigid and accurately balanced construction. It is a one-piece pressed steel unit, combining cabinet jambs, angle struts, sill track, and housing for door hanger, which ensures perfect alignment



CHUBB'S TWO-SPEED LIFT DOORS.

and balance of doors. With the Unity Frame construction, the masonry is protected and relieved of excessive strain, with no risk of fracture, and the fixing becomes a simple matter.

**The Chubb Patent Two-speed Flush Type Controller** operates the doors with a smooth and silent action. The Controller has adjustments for regulating the speed, and the Oil Check is also adjustable in the cushioning of the closing. There are no arms or obstructions projecting over the Fast Door, thus permitting the door being flush with the hatchway.

**Erection:** Chubb's experienced mechanics carry out the erection of the equipment, and in the event of the work having to be fixed by other contractors, full instructions are supplied for the adjusting and regulating of the doors and controllers.

All parts are made from selected high-grade materials, manufactured and assembled by expert tradesmen at CHUBB'S WORKS, WATERLOO, SYDNEY

## SPECIFICATION OF TWO-SPEED LIFT DOOR INSTALLATION

**DOORS.**—Chubb's Hollow Metal, Fire-Resisting Doors, with interlocked and welded joints; sleeved with slab cork, and internally reinforced to receive controller, hanger bolts, buffer stops, and bottom track guides. Design to be selected. (See Drawing No. R. 5374, page 462.)

**UNITY FRAME.**—Combining pressed metal 10-gauge cabinet jambs and trims; angle struts; overhead housing; rider plate and hinged apron encasing hanger; scribed lintel plate over doors; steel non-slip track and tread, 7 in. wide, all welded together as one unit. (See Drawing No. R. 5371, page 459.)

**HANGER.**—Grant sleeved, ball-bearing, gearless, two-speed type, 3.

**CONTROLLER.**—Chubb's patent self-closing, flush, two-speed Controller, fitted with Oil Check, and adjustments for closing speed. (See Drawing No. R. 5371, page 459.)

**ALTERNATIVE CONTROLLER.**—Chubb's self-closing, overlapping, two-speed Controller, fitted with Oil Check, and adjustments for closing speed.

**Note.**—The doors will require to be set back 2 in. from the well face to suit this Controller. (See Drawing No. R. 5372, page 460.)

**BUFFERS.**—Twin adjustable Buffers on closing side, and single adjustable Buffers on opening jamb.

**GLAZING.**—Electro-copper, or other approved type. (For suggested designs, see Drawing R. 5374, page 462.)

**FINISH.**—Buffed, dipped, stoved and spray-bronzed to selected tone.

**LOCKS AND CONTACTS.**—To be supplied by Lift Contractors, and fixed by Chubb's.

The Chubb Controller dispenses with Locks on Switch Control Lift Doors, but Locks are required on Dual Control Doors, for operation by the public.

(Continued on next page)



## CHUBB'S BI-PARTING LIFT DOORS MADE IN AUSTRALIA

Chubb's Bi-parting Lift Doors and Unity Frame are constructed on similar lines as described for the Two-speed Doors shown on page 457; but it will be noted that Bi-parting Doors require recesses on each side of the opening, and are suitable for openings not exceeding 3 ft. 6 in. wide. See Drawing No. R. 5373, page 461.

A great improvement has been made on the old type of Bi-Parting Doors by the introduction of a new Chubb patent device for the Interlock and Electrical Contact. With this device, a comfortable Finger Grip is fitted in the meeting stile of the door, having an extension rod running through the stile to the top of the door, to which is fitted an Interlocking Link, with the Contact overhead.

The Finger Grip is flush, and there are no projecting links, such as a lock, thereby eliminating any risk of tearing of clothes.

The design of this Interlocking Link ensures a perfect contact and fool-proof interlock.

With this device, the Doors are mechanically locked before the control circuit is completed; and, conversely, when opening the doors, the control circuit shall be open before the doors are mechanically unlocked.

### SPECIFICATION OF BI-PARTING LIFT DOOR INSTALLATION

**DOORS.**—Chubb's Hollow Metal, Fire-Resisting Doors, with interlocked and welded joints; sleeved with slab cork, and internally reinforced to receive controller, hanger bolts, buffer stops, and bottom track guides. Design to be selected. (See Drawing No. R. 5374, page 462.)

**UNITY FRAME.**—Combining pressed metal 10-gauge cabinet jambs and trims; angle struts; overhead housing; rider plate and hinged apron encasing hanger; lintel plate over doors; steel non-slip track and tread, 7 in. wide. All welded together as one unit. (See Drawing No. R. 5373, page 461.)

**HANGER.**—Grant sleeved ball-bearing, chain traction type, 5, on ball-race sheaves.

The Flush Interlock device dispenses with the loose cables travelling with the doors, and ensures the maximum of safety.

Another improved feature in Chubb's Bi-Parting Doors is a tubular rubber buffer running full height of doors, and fitted in extruded metal housings in the meeting stiles. This buffer cushions at the closing of doors.

The Bi-Parting Doors can be made self-closing by using Chubb's Patent Flush Controller. For this construction, see Drawing No. R. 5373, page 461.

### Erection

Chubb's experienced mechanics carry out the erection of the equipment, and in the event of the work having to be fixed by other contractors, full instructions are supplied for the adjusting and regulating of doors and controllers.

All parts are made from selected high-grade materials, manufactured and assembled by expert tradesmen at CHUBB'S WORKS, WATERLOO, SYDNEY.

**CONTROLLER.**—Chubb's patent self-closing, flush controller, fitted with Oil Check, and adjustments for closing speed. (See Drawing No. R. 5373, page 461.)

**Note.**—This controller is only necessary for Dual Control Lifts.

**BUFFERS.**—Doors are fitted with extruded metal housings, full height, and have 1 in. tubular rubber buffer for cushioning the meeting of doors.

**GLAZING.**—Electro-copper, or other approved type. (For suggested designs, see Drawing No. R. 5374, page 462.)

**FINISH.**—Buffed, dipped, stoved, and spray-bronzed to selected tone.

**ELECTRICAL CONTACT.**—To be supplied by Lift Contractors, to suit Chubb's patent interlocking link.

## CHUBB'S TWO-SPEED AND SINGLE LIFT DOORS, ALSO LIFT CARS LIST OF PRINCIPAL INSTALLATIONS

### NEW SOUTH WALES.

Commonwealth Bank, Sydney — Extensions to Head Office  
Government Savings Bank of N.S.W.  
Commercial Banking Co. of Sydney.  
Bank of N.S.W.  
Commercial Bank of Australia Ltd.  
Anthony Hordern's Ltd.  
Farmer & Co. Ltd.  
Beharfold's Ltd.  
Mark Foy's Ltd.  
Murdoch's Ltd.  
Gowing Bros. Ltd.  
Hordern Bros. Ltd.  
G.P.O., Sydney.  
Parliament House, Canberra.  
Sydney "Morning Herald" Office.  
"Sun" Office.  
Stanton House.  
Australia House.  
Grace House.  
Kyle House.  
State Shopping Block.  
St. James' Theatre Building.  
Agriculture Building.  
B.M.A. Building.  
Town Hall, Sydney.  
Morris Hotel.  
Masonic Club.  
Tattersall's Club.  
City Tattersall's Club.  
University Club.  
T. & G. Insurance Co. Ltd.  
Colonial Mutual Insurance Co. Ltd.  
Yorkshire Insurance Co. Ltd.

Federal Mutual Insurance Co. Ltd.  
Mercantile Mutual Insurance Co. Ltd.  
Equitable Building Co.  
Technical College.  
Manly Hospital.  
Kurri Kurri Hospital.  
Newcastle Hospital.  
Wollongong Hospital.  
Marrickville Hospital.  
Bathurst Hospital.

### VICTORIA.

Commonwealth Bank, Melbourne.  
E.S. & A. Bank, Melbourne.  
Commercial Banking Co. of Sydney, Melbourne Office.  
Union Bank, Melbourne.  
National Bank, Geelong.  
Town Hall, Melbourne.  
Norman Bros., Melbourne.  
Myers Building, Melbourne.  
Alexander Smith Building, Melbourne.  
Makower, McBeath Ltd., Melbourne.  
Williamson's Theatre, Melbourne.  
Athenaeum Club, Melbourne.  
Automobile Club, Melbourne.  
A.P.A. Building, Melbourne.  
Equitable Building, Melbourne.  
A.M.P. Building, Melbourne.  
Equity Trustees Building, Melbourne.  
Colonial Mutual Insurance Co., New Building, Melbourne.

### QUEENSLAND.

Commonwealth Bank, Brisbane.  
Treasury Building, Brisbane.

Town Hall, Brisbane.  
T. & G. Building, Brisbane.  
National Mutual Building, Brisbane.  
Colonial Mutual Insurance Co., New Building, Brisbane.  
Ascot Chambers, Brisbane.  
Tattersall's Club, Brisbane.  
Rowe's Building, Brisbane.  
Globe Hotel, Brisbane.  
Allan & Stark Ltd., Brisbane.  
Brisbane Hospital.  
Rockhampton Hospital.  
Maryborough Hospital.

### SOUTH AUSTRALIA.

Bank of Australasia Chambers, Adelaide.  
G.P.O., Adelaide.  
T. & G. Building, Adelaide.  
National Mutual Building, Adelaide.  
Works and Railways Dept., Adelaide.  
Adelaide Hospital.

### WEST AUSTRALIA.

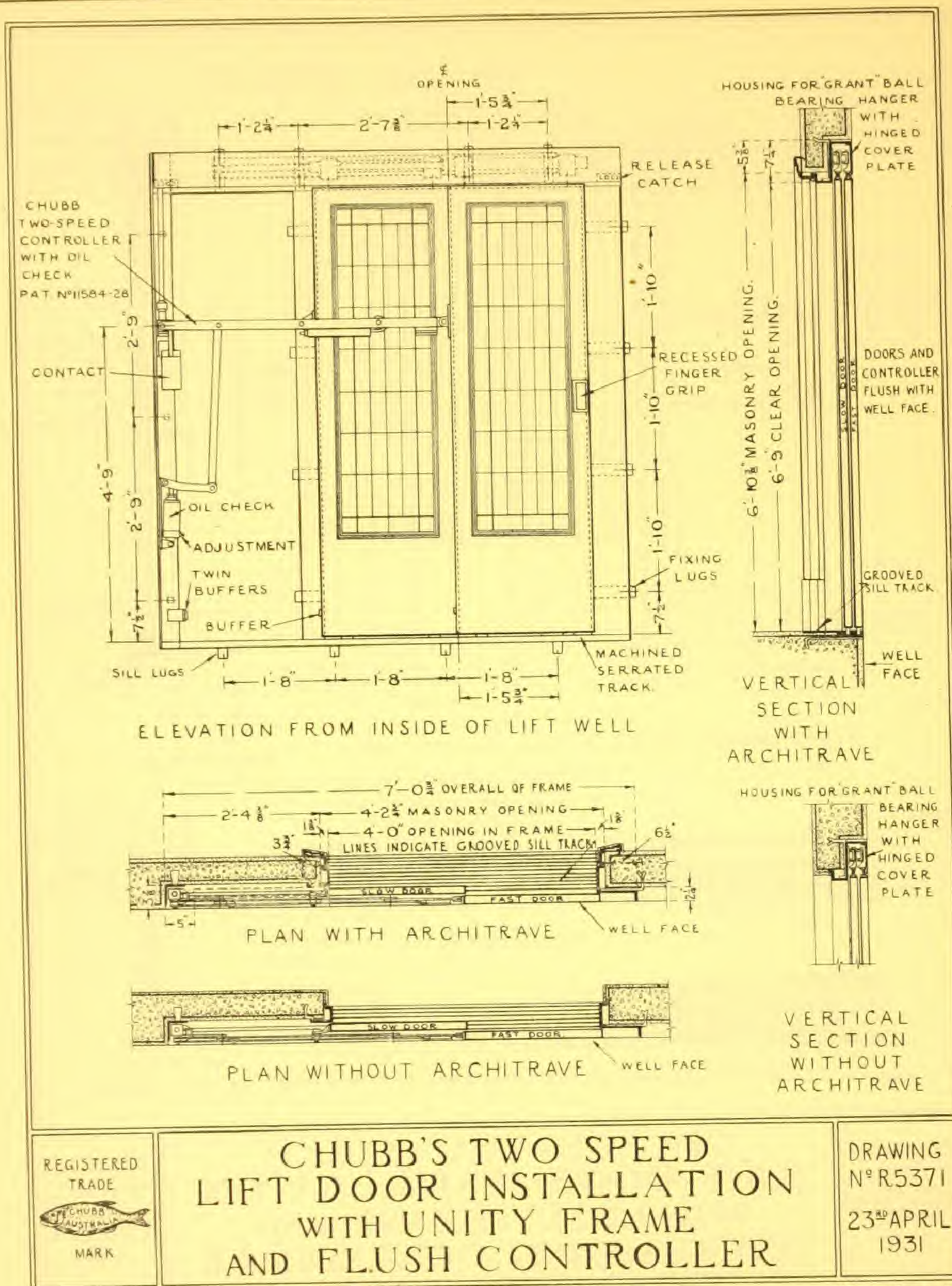
Commonwealth Bank New Building, Perth.  
Royal Insurance Co., Perth.  
Harris, Scarfe & Sandovers Ltd., Perth.

### NEW ZEALAND.

National Bank, Wellington.  
Dominion Building, Wellington.  
"Evening Post" Building, Wellington.  
Commercial Travellers' Club, Wellington.  
Yorkshire Insurance Co., Auckland.

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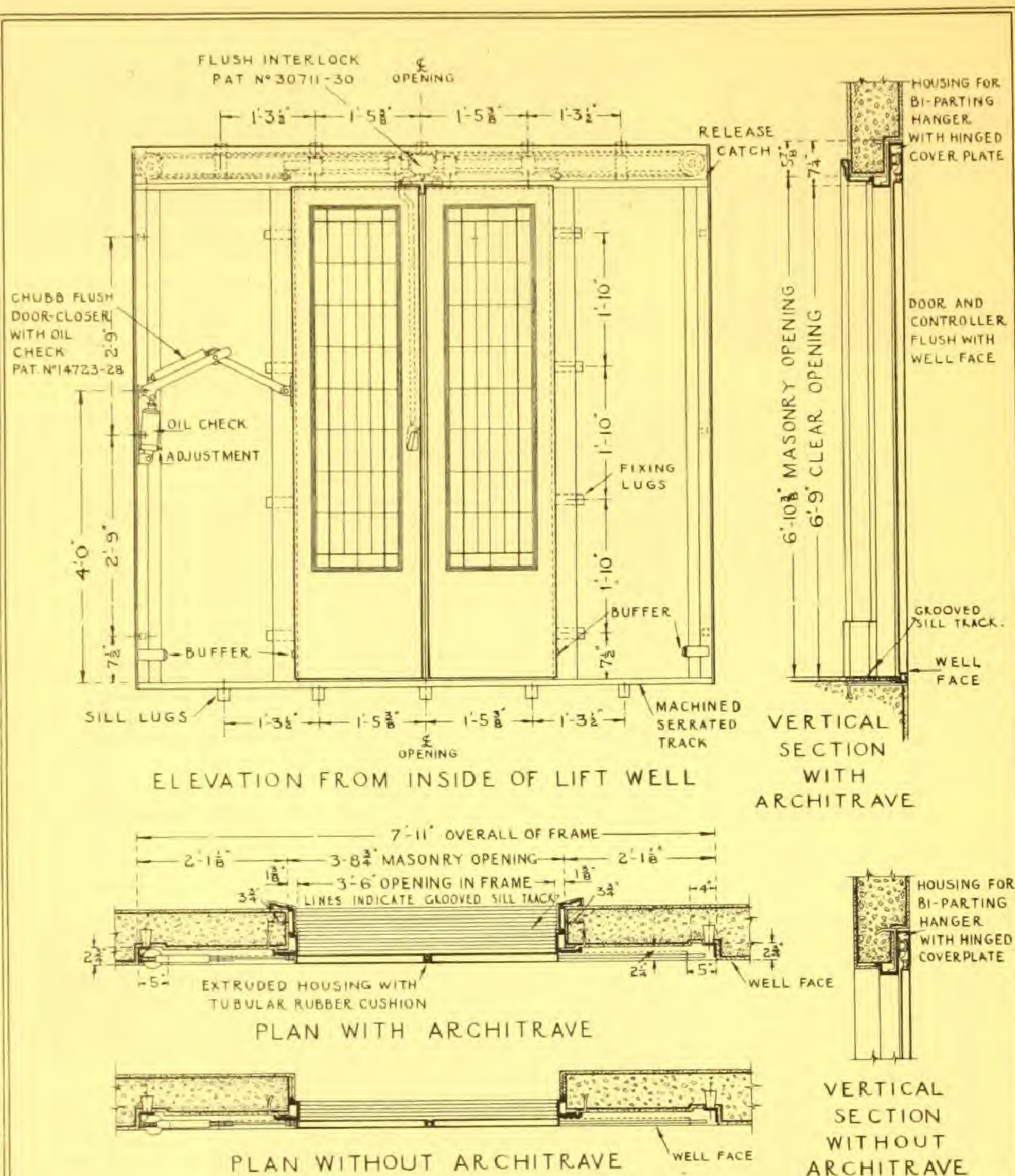
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RAMSAY'S CATALOGUE







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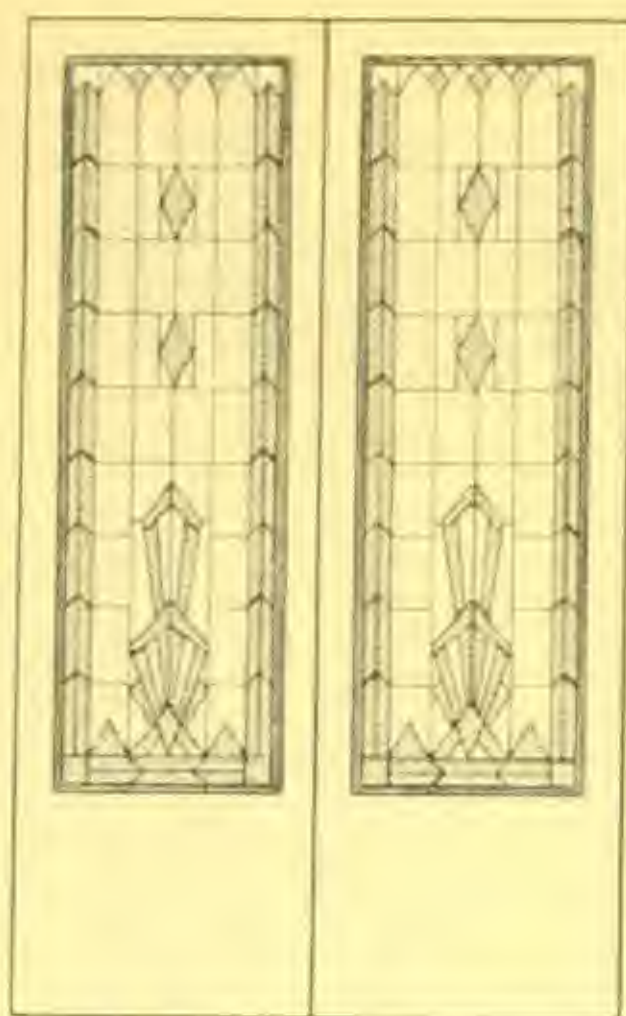
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# CHUBB'S BI-PARTING LIFT DOOR INSTALLATION WITH UNITY FRAME AND FLUSH CONTROLLER

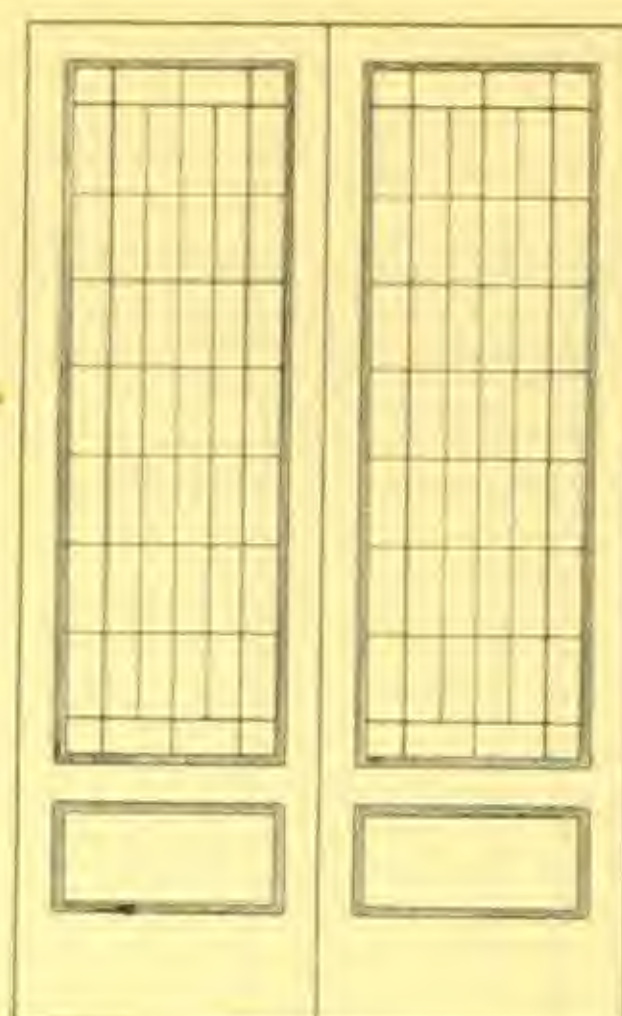
DRAWING  
N° R537323<sup>RD</sup> APRIL  
1931

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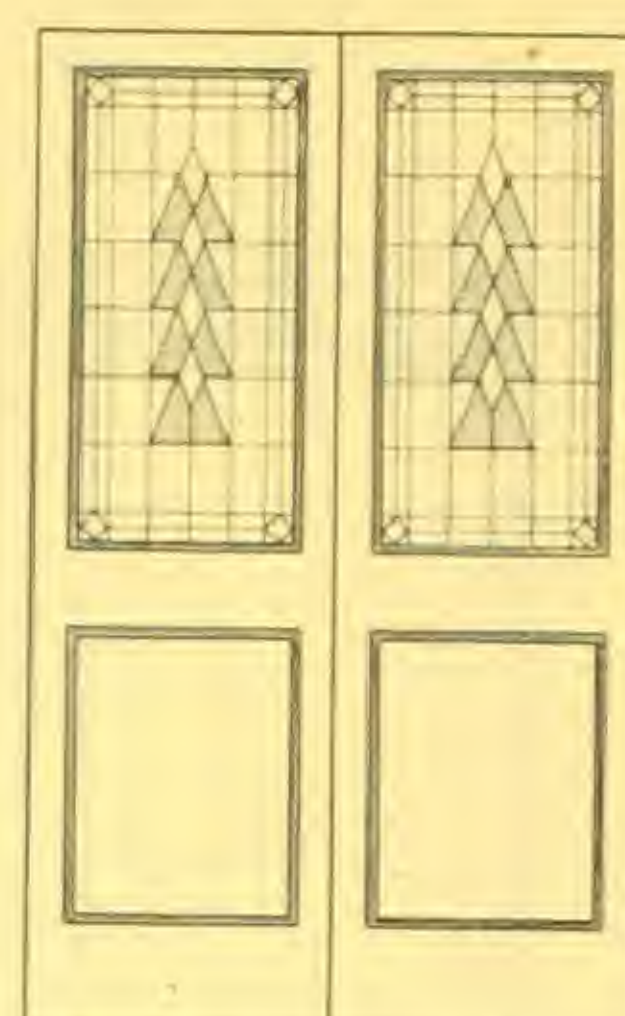




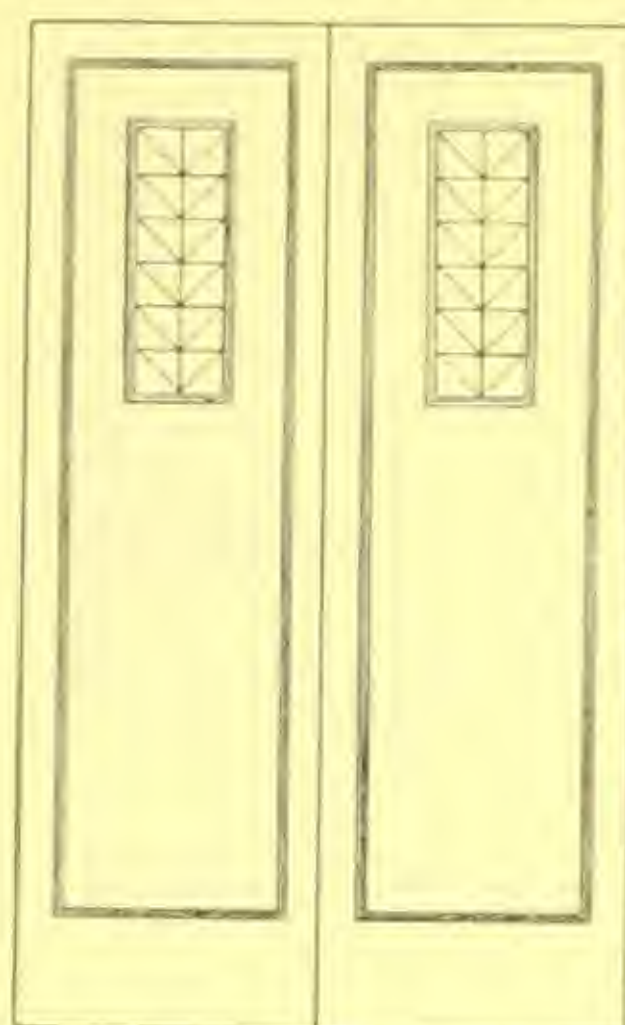
DESIGN N°1



DESIGN N°2



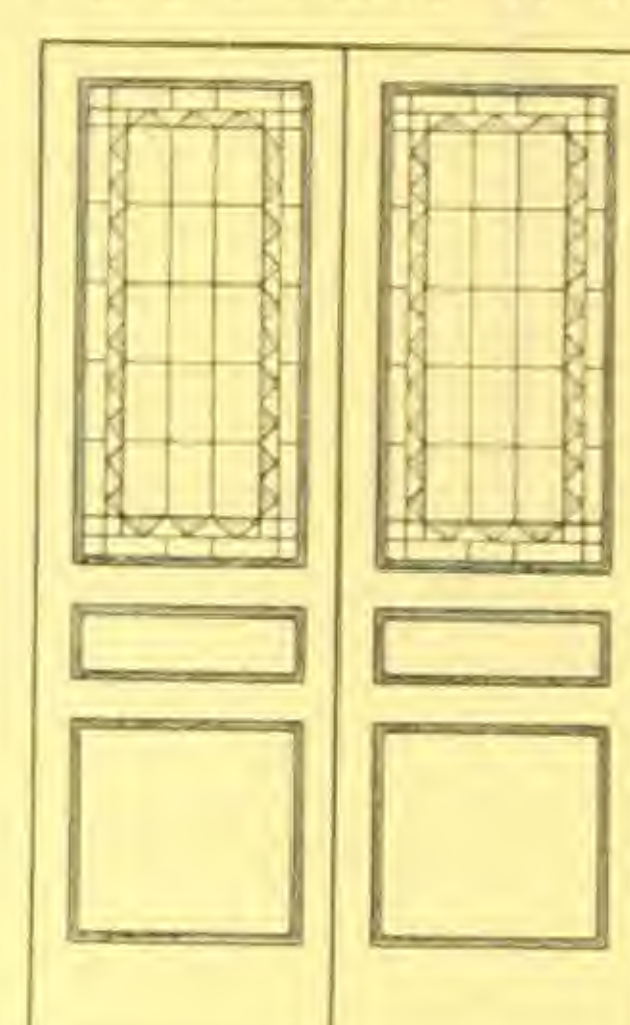
DESIGN N°3



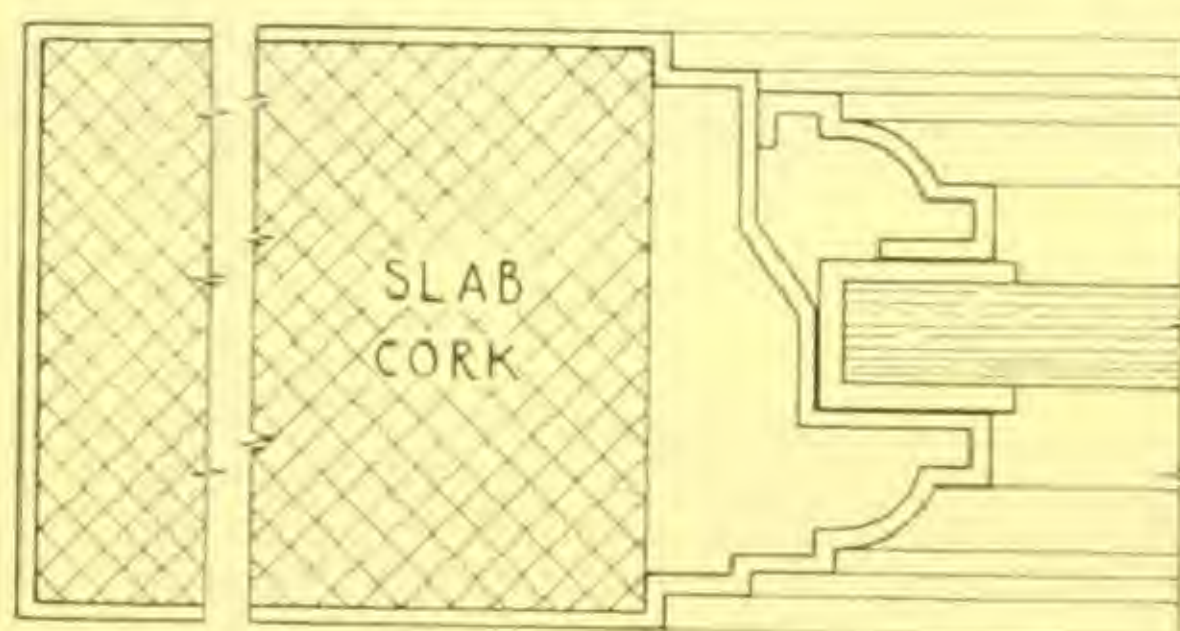
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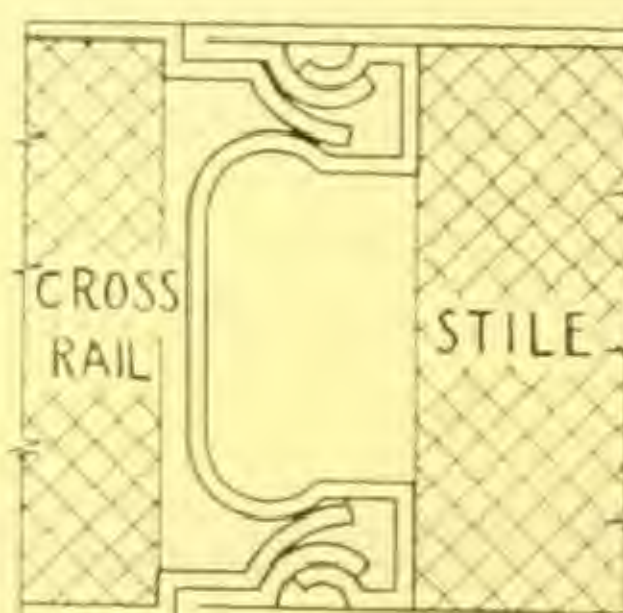
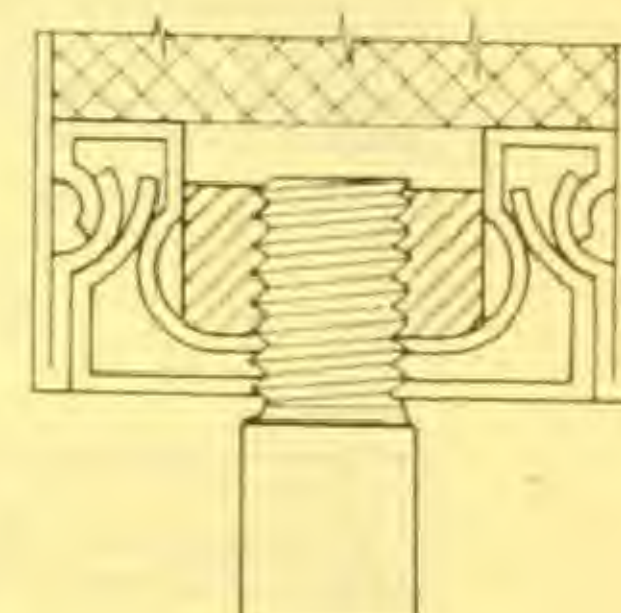
DESIGN N°5



DESIGN N°6



SECTION THRU STILE

SECTION OF  
INTERLOCKED JOINTBOTTOM  
OF DOOR

CHUBB'S STANDARD  
TWO-SPEED AND BI-PARTING  
HOLLOW METAL FIRE  
RESISTING LIFT DOORS

DRAWING  
N° R5374  
23<sup>RD</sup> APRIL  
1931



<p><b>33g</b></p> <p>S.A.A. File No.</p>	<p><b>CHUBB'S AUSTRALIAN COMPANY LTD.</b>          With Which is Incorporated  <b>RICHARD BROTHERS</b>  <b>Art Metal Workers</b></p> <p>164 CLARENCE STREET, SYDNEY.      120 QUEEN STREET, MELBOURNE.          Works at ELIZABETH STREET, WATERLOO, SYDNEY.</p> <p>Agencies At:          BRISBANE: James Campbell &amp; Sons Ltd.      ADELAIDE: Burns, Philp &amp; Co. Ltd.          PERTH: Harris, Scarfe &amp; Sandovers Ltd.      HOBART: Charles Davis Ltd.          WELLINGTON, N.Z.: A. C. Gillies &amp; Laird Ltd.</p>	<p>REGISTERED TRADE</p>  <p>MARK</p>
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## MADE IN AUSTRALIA

## PRODUCTS

Two-speed, Bi-Parting, and Single Sliding Hollow Metal Lift Doors; Chubb Patent Lift Door Closers and Oil Checks; Pressed Metal Lift Cars; Hollow Metal Office Doors and Partitions; Pressed Metal Jambs, Architraves, and Skirtings; Wrought-Iron Entrance Gates; Wrought-Iron Balustrading; Collapsible Gates; Strongrooms; Safe Deposits; Reinforcements for Strongrooms; Strongroom Doors; Safes; Steel Grilles; Steel Shelving; Locks.

## SINGLE SLIDING HOLLOW METAL FIRE-RESISTING LIFT DOOR

Chubb's Single Sliding Hollow Metal Fire-Resisting Lift Door is constructed with 18-gauge ingot iron base furniture steel, sleeved with slab cork; and all joints are interlocked and welded, thus preventing warping or twisting of door, or breaking of joints. Door is internally reinforced to stand up to heavy wear and tear.

The Unity Frame is specially designed to give a rigid and accurately balanced construction. It is a one-piece pressed steel unit, combining cabinet jambs, angle strut, sill track, and housing for door hanger, which ensures perfect alignment and balance of door. With the Unity Frame construction, the masonry is protected and relieved of excessive strain, with no risk of fracture, and the fixing becomes a simple matter.

The Chubb Patent Flush Type Controller was principally introduced for Dual Control Lifts, and ensures the door being closed



CHUBB'S SINGLE SLIDING LIFT DOORS.

silently without damage to the lock. It entirely abolishes the irritations caused by the public leaving the doors open, and thus putting the Lift out of action.

The old method of a gravity hung door resulted in noisy banging of locks, doors rebounding out of locks, fracturing of masonry, and Lift being put out of action through imperfect closing of doors. All these difficulties are overcome by the use of the Chubb Patent Controller.

**Erection:** Chubb's experienced mechanics carry out the erection of the equipment, and in the event of the work having to be fixed by other contractors, full instructions are supplied for the adjusting and regulating of doors and controllers.

All parts are made from selected high-grade materials, manufactured and assembled by expert tradesmen at CHUBB'S WORKS, WATERLOO, SYDNEY.

## SPECIFICATION OF SINGLE SLIDING LIFT DOOR INSTALLATION

**DOOR.**—Chubb's Hollow Metal Fire-Resisting Door, with interlocked and welded joints; sleeved with slab cork, and internally reinforced to receive controller, hanger bolts, buffer stops and bottom track guides. Design to be selected. (See Drawing No. R. 5376, page 465.)

**UNITY FRAME.**—Combining pressed metal 10-gauge cabinet jambs and trims; angle strut; overhead housing; rider plate and hinged apron encasing hanger; steel non-slip track and tread, 7 in. wide. All welded together as one unit. (See Drawing No. R. 5375, page 464.)

**HANGER.**—Grant sleeved, ball-bearing, type, 2.

**CONTROLLER.**—Chubb's patent self-closing, flush Controller, fitted with Oil Check and adjustments for closing speed. (See Drawing No. R. 5375, page 464.)

**BUFFERS.**—Adjustable Buffers on closing side, and on opening jamb.

**GLAZING.**—Electro-copper, or other approved type. (For suggested designs see Drawing No. R. 5376, page 465.)

**FINISH.**—Buffed, dipped, stoved, and spray-bronzed to selected tone.

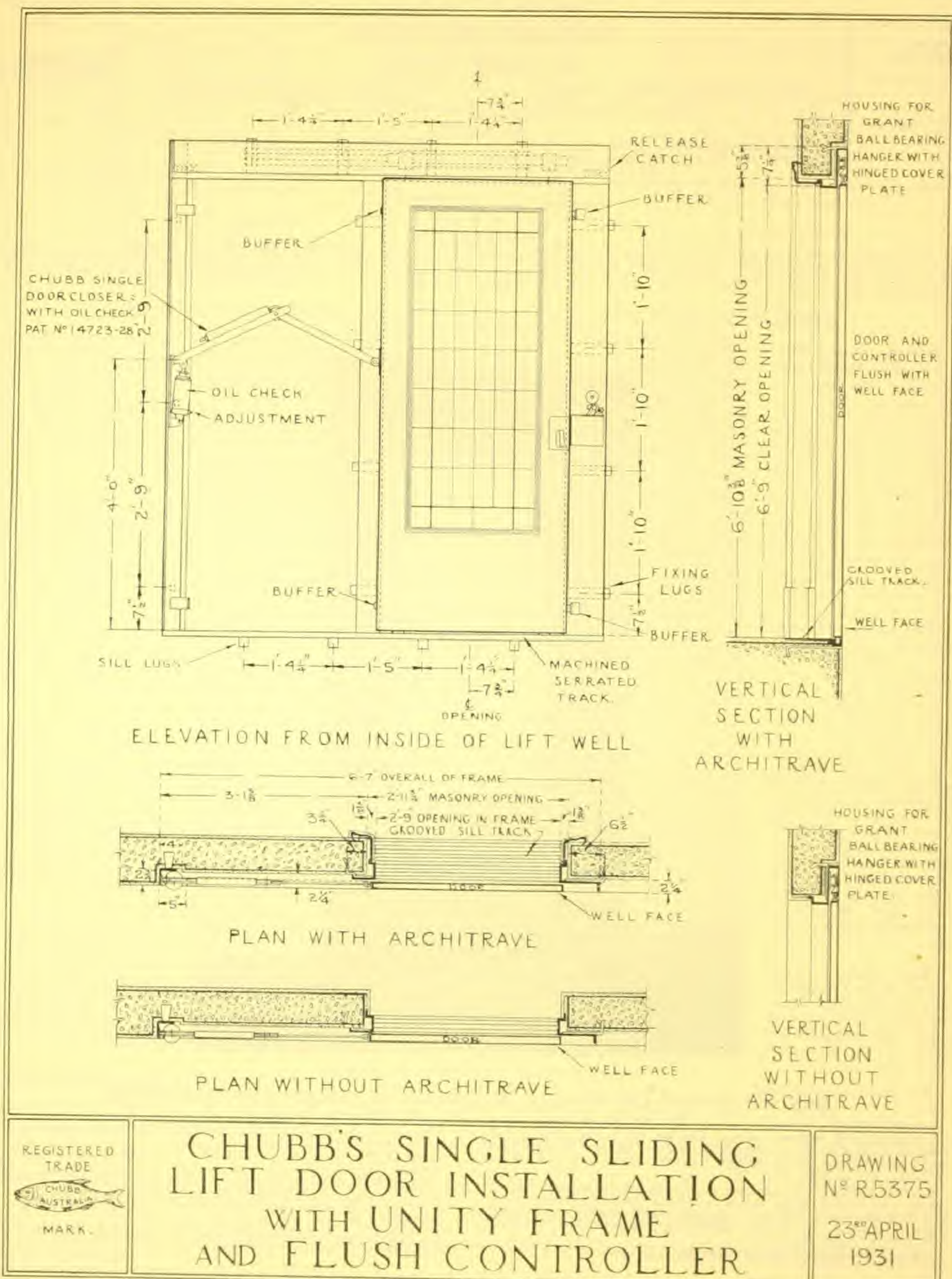
**LOCKS AND CONTACTS.**—To be supplied by Lift Contractors, and fixed by Chubb's.

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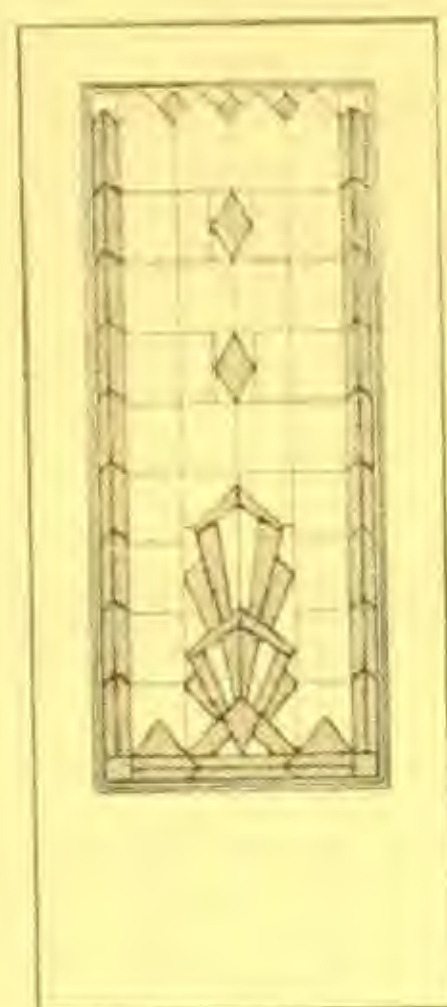
FOR LIST OF PRINCIPAL INSTALLATIONS. SEE PAGE 458

RAMSAY'S CATALOGUE

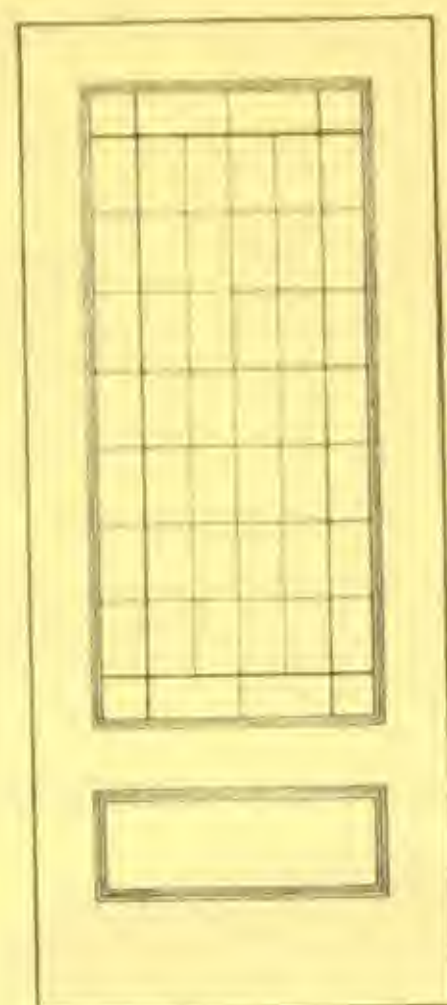




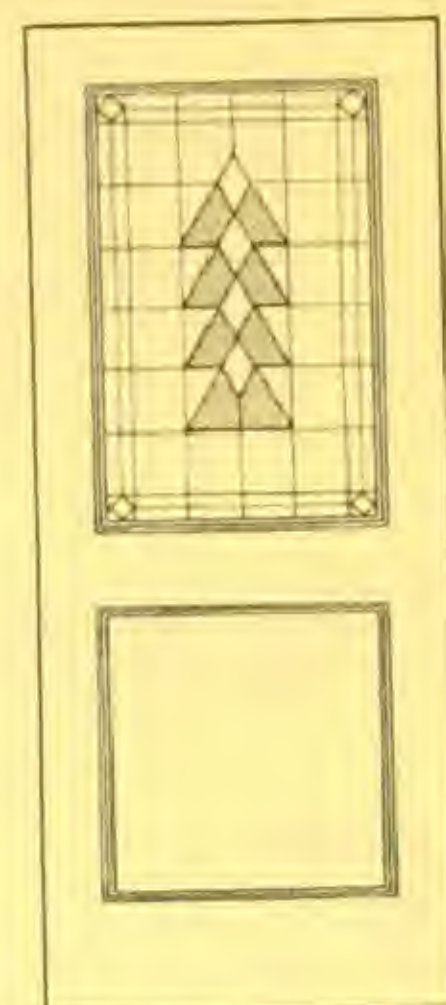




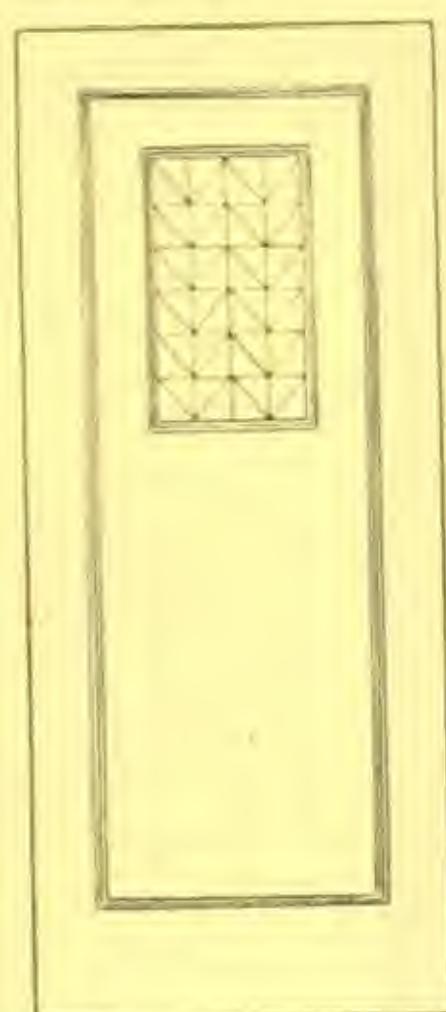
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DESIGN N° 2



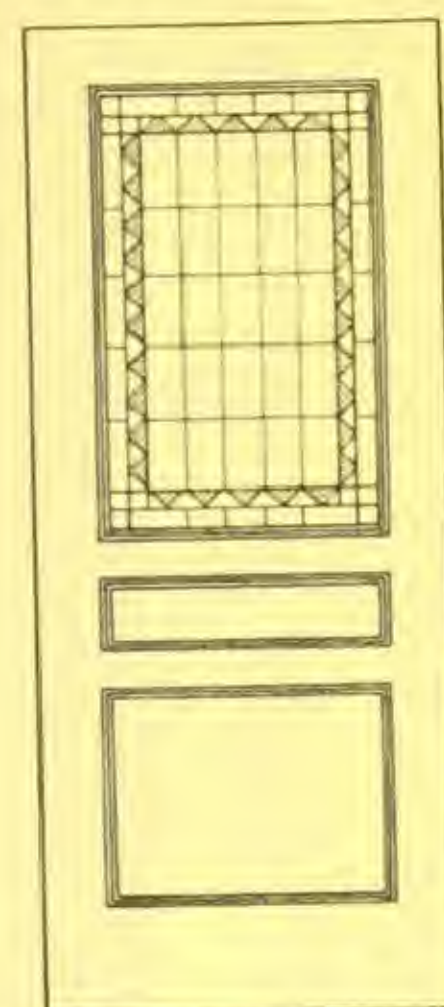
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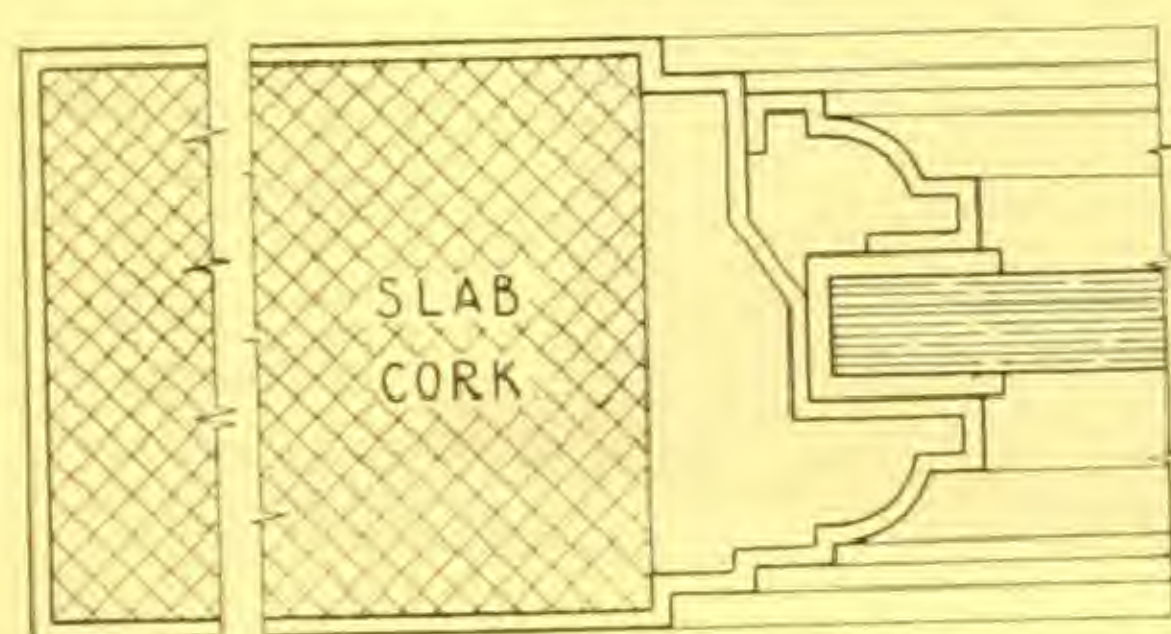
DESIGN N° 4



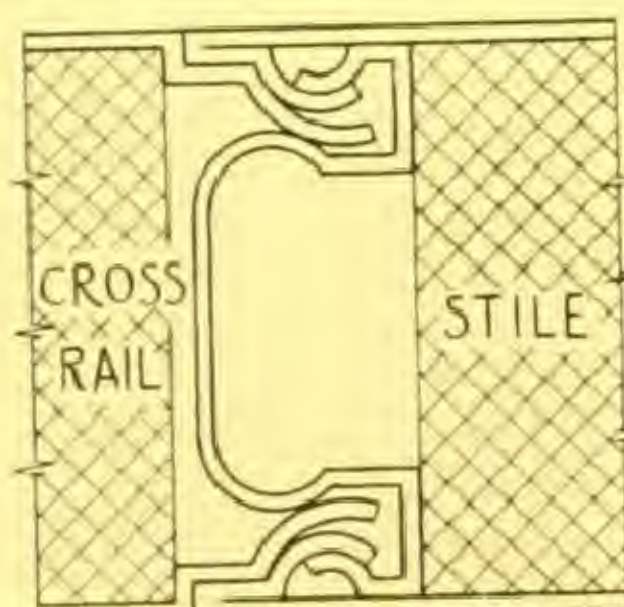
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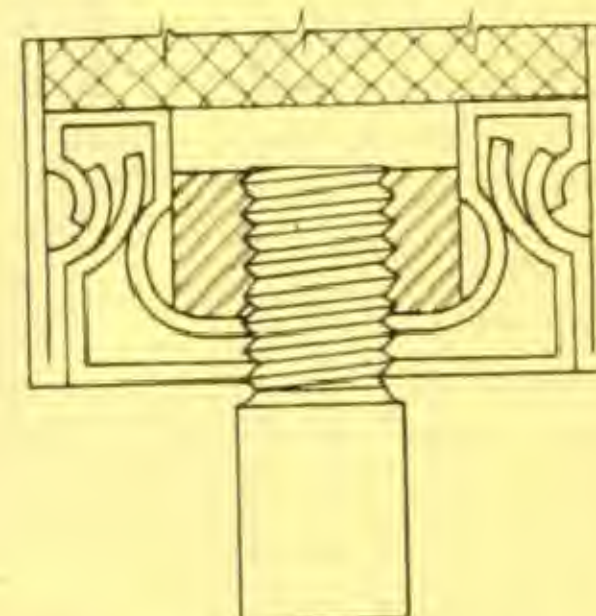
DESIGN N° 6



SECTION THRU STILE

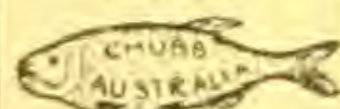


SECTION OF  
INTERLOCKED JOINT



BOTTOM  
OF DOOR

REGISTERED  
TRADE



MARK.

CHUBB'S STANDARD  
SINGLE HOLLOW METAL  
FIRE RESISTING LIFT DOORS

DRAWING  
N° R5376

23<sup>RD</sup> APRIL  
1931

(Continued on next page)



# CHUBB'S AUSTRALIAN COMPANY LTD.

With Which is Incorporated

**RICHARD BROTHERS**

*Art Metal Workers*

164 CLARENCE STREET, SYDNEY.

120 QUEEN STREET, MELBOURNE.

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WELLINGTON, N.Z.: A. C. Gillies & Laird Ltd.

REGISTERED  
TRADE



MARK

33g

S.A.A. File No.

MADE IN AUSTRALIA

## PRODUCTS

Two-speed, Bi-Parting, and Single Sliding Hollow Metal Lift Doors; Chubb Patent Lift Door Closers and Oil Checks; Pressed Metal Lift Cars; Hollow Metal Office Doors and Partitions; Pressed Metal Jambs, Architraves, and Skirtings; Wrought-Iron Entrance Gates; Wrought-Iron Balustrading; Collapsible Gates; Strongrooms; Safe Deposits; Reinforcements for Strongrooms; Strongroom Doors; Safes; Steel Grilles; Steel Shelving; Locks.

## CHUBB'S PRESSED METAL LIFT CARS

Chubb's Pressed Metal Lift Cars are designed to give the minimum of weight, and the lightest possible materials are used throughout. The construction is a pressing and interlocking method, which ensures the maximum of strength and permanent rigidity.

The use of steel throughout makes the Cars fire-resisting, hygienic and vermin-proof.

Cars are constructed of ingot iron base rust-resisting furniture steel. The ornamental grillework panels are of aluminium alloy, and the plain panels are of pressed metal.

The body of Lift Car is of 14-gauge steel, reinforced by flanging and interlocking method, which dispenses with structural steel or other heavy materials. There are no visible joints.



CHUBB'S PRESSED METAL LIFT CAR.

Screws or rivets are not used on the inside face of body-work or dome.

Mouldings are firmly clipped, and properly interlocked.

Particular attention has been paid to the rigidity of the Car dome, to guard against deflection.

The roof is decked with 1 in. timber, and a manhole hinged flap is fitted for emergency purposes.

**Ventilation.** — A most important detail in the construction of a Lift Car is the ventilation, and provision is made in the dome and body of Chubb Lift Cars for grille panels to permit of correct ventilation.

In single shafts, Cars are fitted with hit-or-miss ventilators in the base, to take in the air with the travel, and the air is circulated as desired through the grilles in top panels and dome.

### DESIGNS

On Drawing No. R. 5371, page 467, four standard designs of Lift Cars are shown.

Design No. 1 is the pressed metal vertical and cross-rail construction.

Design No. 2 is a pressed metal panelled construction.

Design No. 3 is plain, and similar in construction to No. 1.

Design No. 4 is a flush panel construction, specially suitable for hospitals and other institutions where the strictest hygienic conditions are imperative.

### FINISH

Cars are buffed, stoved and spray-bronzed to selected tone.

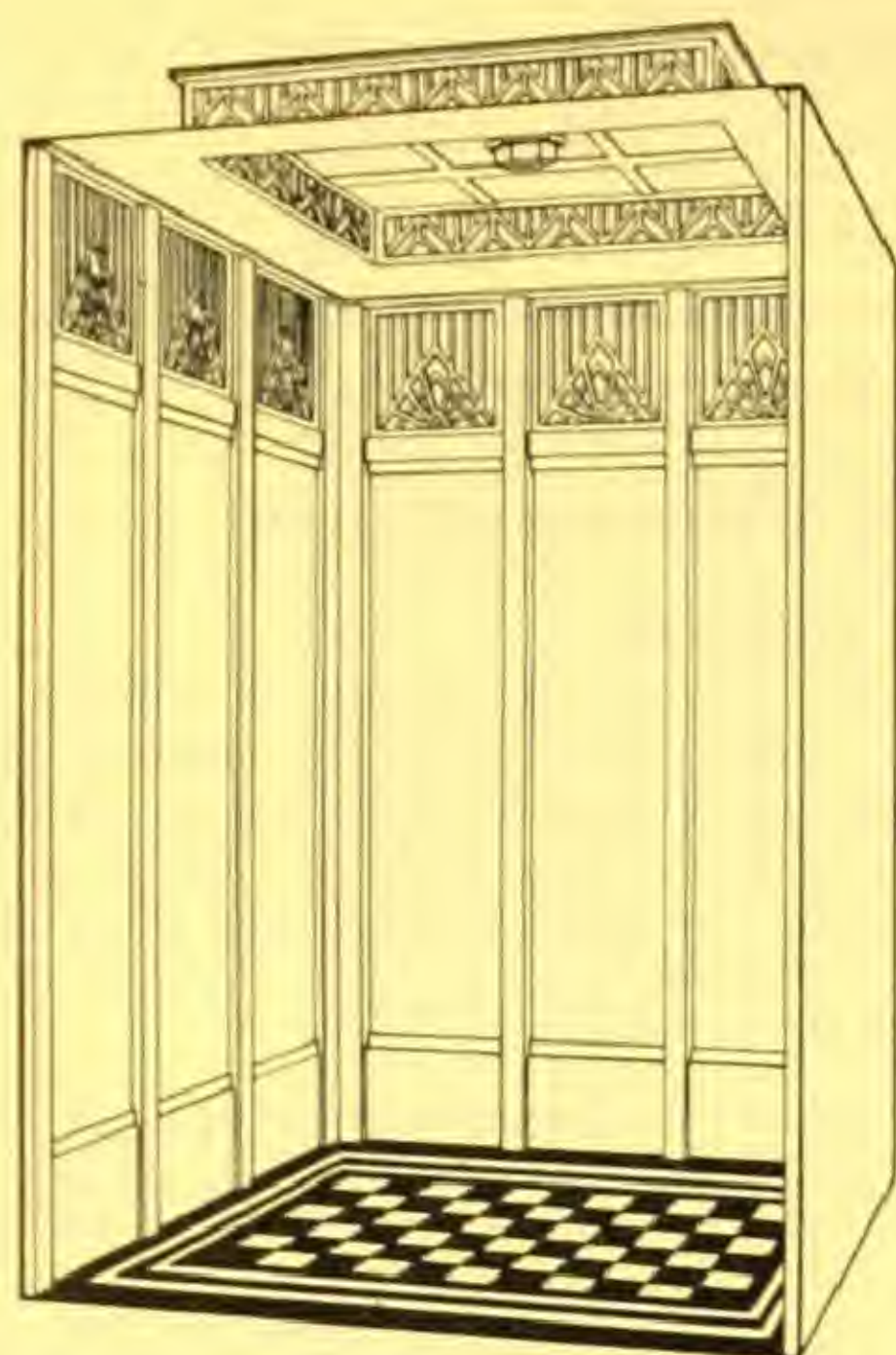
Special grained finishes, to give high-class wood effects, can be executed if required.

All parts are made from selected high-grade materials, manufactured and assembled by expert tradesmen at CHUBB'S WORKS, WATERLOO, SYDNEY.

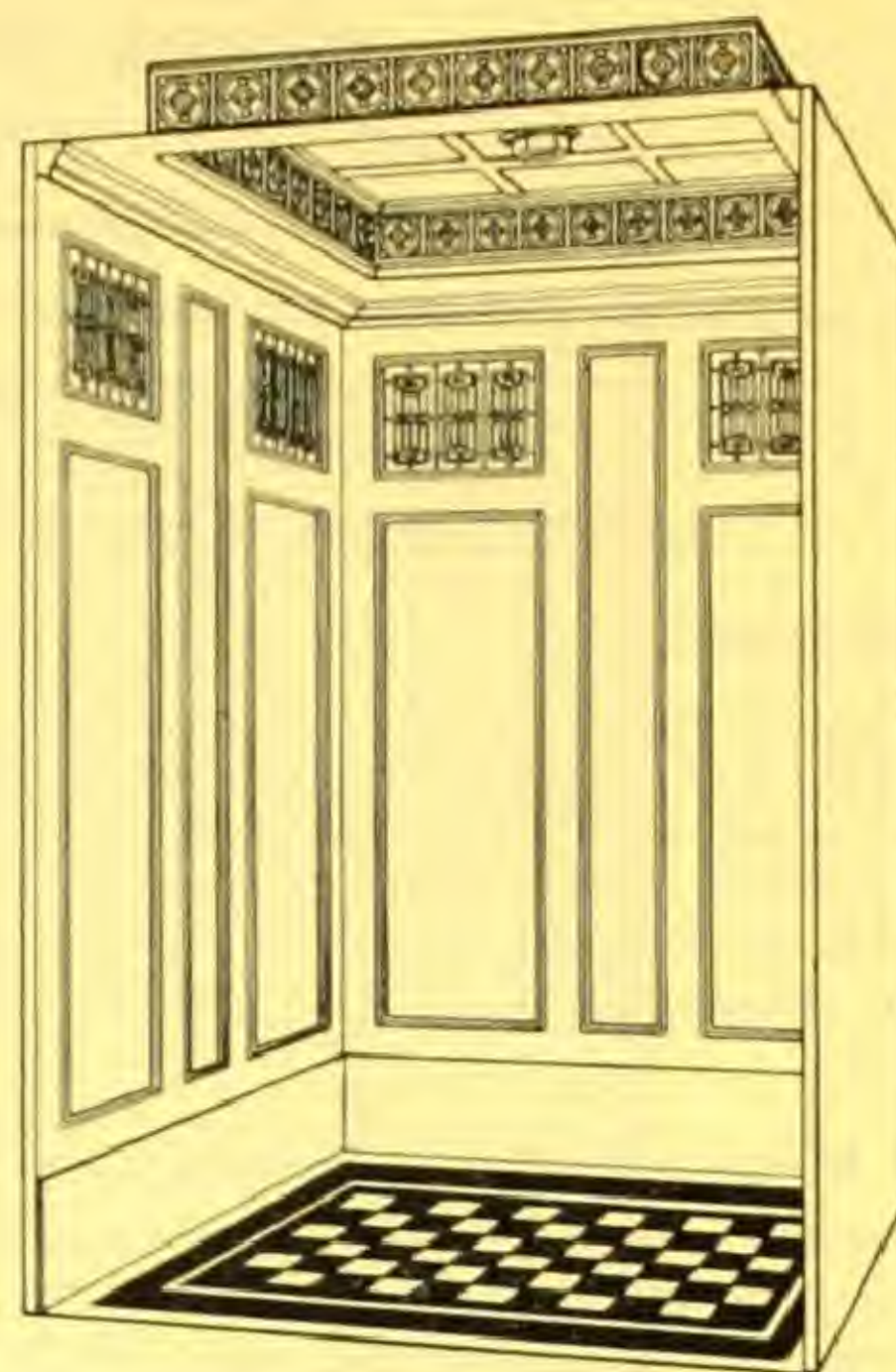
*For List of Principal Installations, see page 458*

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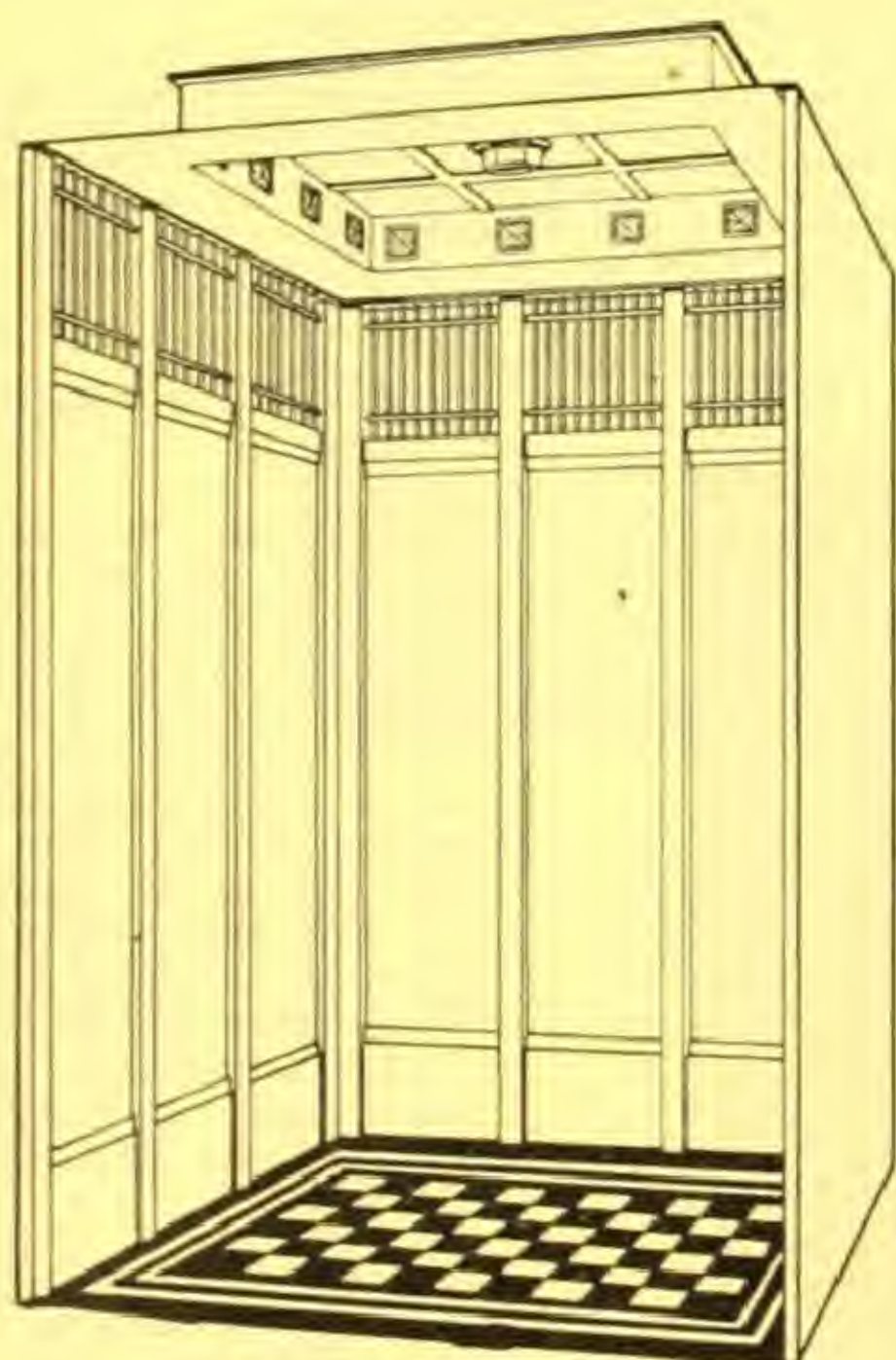




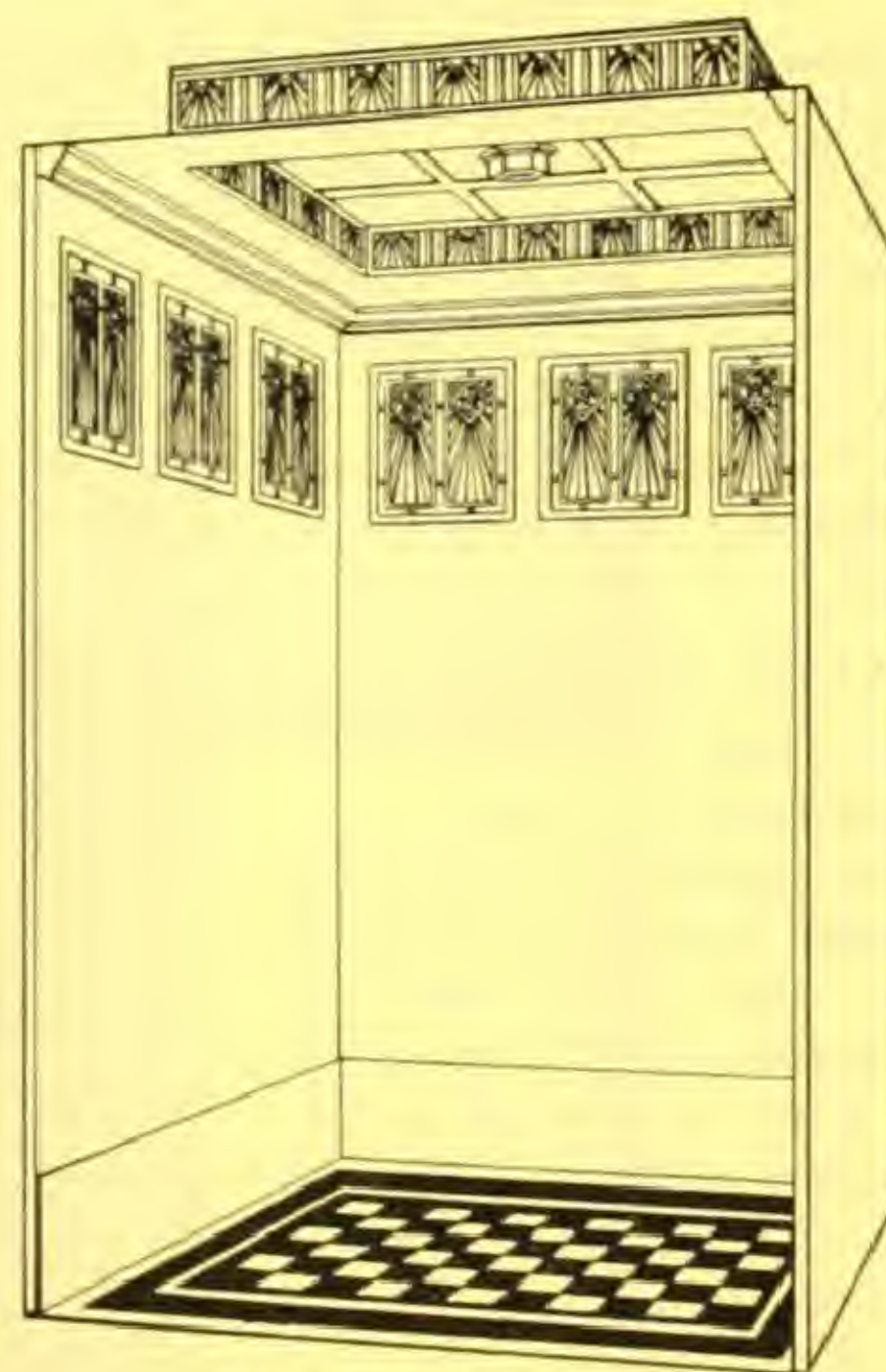
DESIGN N°1



DESIGN N°2



DESIGN N°3



DESIGN N°4

REGISTERED  
TRADE



MARK

CHUBB'S STANDARD  
LIGHT WEIGHT  
PRESSED-METAL LIFT CARS

DRAWING  
N° R5377

23<sup>RD</sup> APRIL  
1931



	<b>BROOKS, ROBINSON &amp; CO. LTD.</b>	
<b>33g</b>	ELIZABETH STREET, MELBOURNE	
	WORKS: MAFFRA STREET, SOUTH MELBOURNE	<b>B-R</b>
S.A.A. File No.	Telephone M 3131 (5 lines)	

[For Other Products, See Pages 70, 95, 141, 172 and 235]

## LIFT DOOR AND ELEVATOR CONSTRUCTION

### Modern Requirements

The steady improvement in the construction of high-powered Elevator machinery and equipment has necessitated much thought on the part of Metal Craftsmen to provide cars, doors, surrounds and indicators to be in keeping with and fulfil the efficient service demanded of these "modern cars in vertical streets."

### Application of Metal to Lifts, Doors and Cars

After the necessary machinery has been installed by the lift contractors, the metal craftsman is required to confine his attention to the actual door openings and cars. The use of metal has solved the problem as far as providing a serviceable and aesthetic article.

Almost any design (ornamental or plain) becomes practicable; but taking everything into account, there is no doubt that the use of metal sheathed mouldings as framing with 16 gauge sheet metal panels is the best. It has the advantage of being light in construction and has not the shallow metallic ring of hollow metal section cages. They are sound absorbing and therefore comfortable.

### Dimensions of Cars and Doors

The size of the car depends on the number required to serve a given area, their speed and so on, which are usually determined by the architect; the usual size being on an average 5 ft. 6 in. x 5 ft. 6 in. or 6 ft. x 5 ft. 6 in. for office buildings with a single sliding door in an opening which should be not less than 2 ft. 6 in. wide and 6 ft. 8 in. high.

Large shops and departmental stores and hotels require much larger cars—10 ft. x 6 ft. and 7 ft. x 6 ft. are not uncommon. As much door-opening as possible should be provided. The use of bi-parting two-speed and three-speed doors are a solution to this problem.

### Lift Doorways

There are various methods of treating the door openings. Regulations require the jambs to be solid, and to ensure this a frame of 5 in. x 2½ in. channel section, with rider plate to carry track, is built in as the concreting proceeds. On this steelwork any other jamb and architrave treatment may be fixed. Methods of finishing doorways are as follows:—

1. Drawn metal sheathed mouldings, one section being for the jamb lining and the other section for the architrave. This is the best method, as any desired section may be given, the angles of members of all mouldings being clean and sharp.
2. Very often 2-inch angle irons are used as frames. With this method, by fixing an additional small angle on the outside edge of wall, a sheet-metal panel may be fixed at the backs of these angles, and so forms the jamb and soffit lining. This method is not quite satisfactory owing to the wide area of sheet metal and is used in a cheaper class of construction.
3. A combination of the above methods is the use of a folded channel section of heavy gauge metal, which serves the dual purpose of being serviceable (taking the place of the channel back) and forming the soffit lining. The architrave may be of similar material. This method is very serviceable, but all angles are rounded and makes the sections rather limited in design.

### "Luxfer" Fire Resisting Lift Doors

The patent "Luxfer" Fire-resisting Lift Door as is now universally adopted throughout Australia, is the outcome of much thought and experiment on the part of Brooks, Robinson & Co. Ltd., who are pioneers of this class of metal work and construction. Needless to say that this door has stood up to the most exacting and rigid tests and is passed by the M.C.C. for use in buildings in one occupancy such as office buildings, etc. The door is light in weight and durable in construction. The use of beads and solder of any description is entirely eliminated.

The panel is glazed with "Luxfer" Fire-resisting glazing, the glass is ¼ in. in thickness, and only the strips of copper are used to frame each piece of glass, which must not exceed 16 square in. in area, and one panel only to each door must not exceed 5 square in. in area.

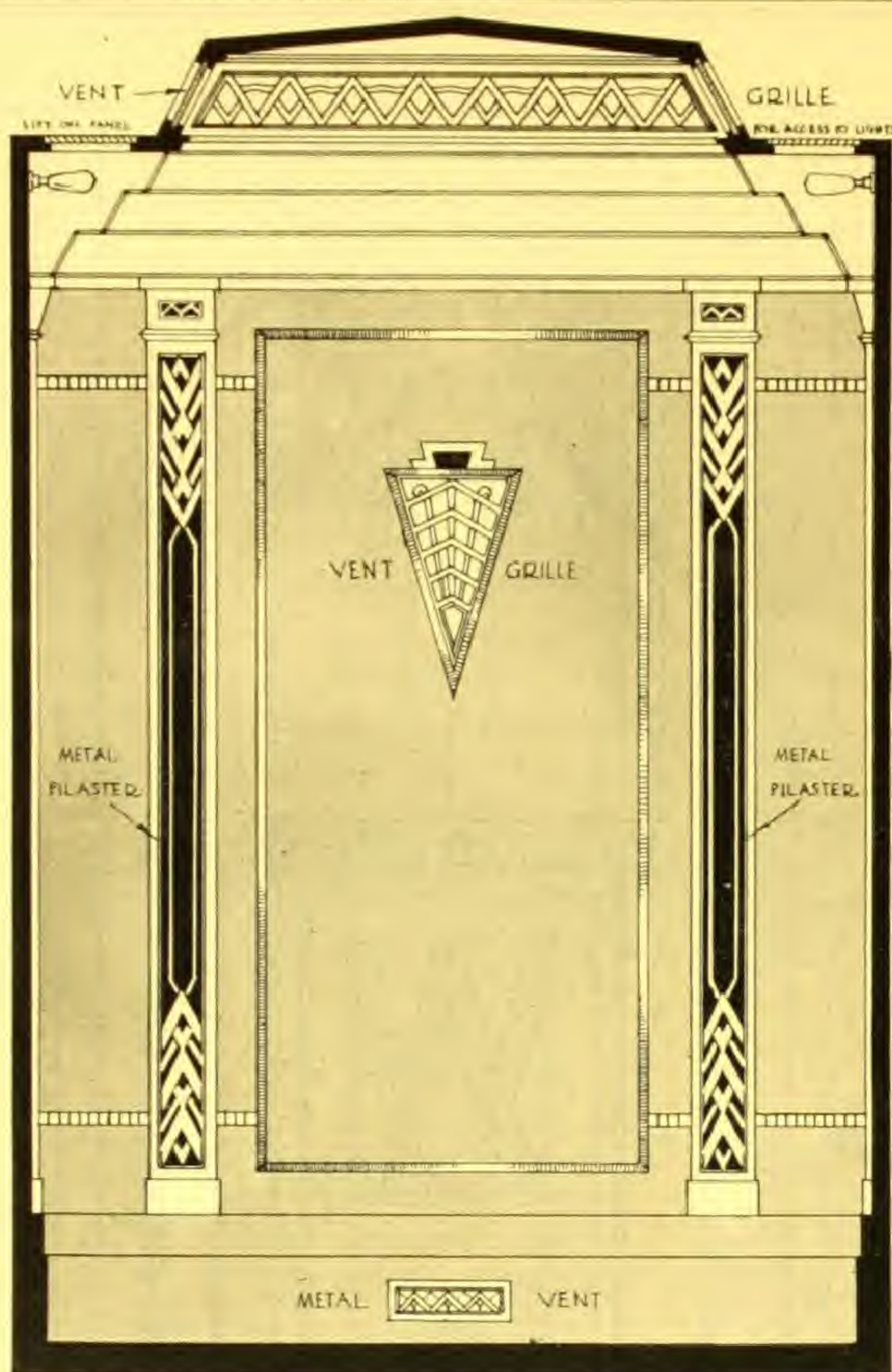
The illustration shows the highly ornamental type of work that can be produced, not only in the actual metal work, but also in the "Luxfer" glazing where cast ornament has been introduced as a surface decoration.



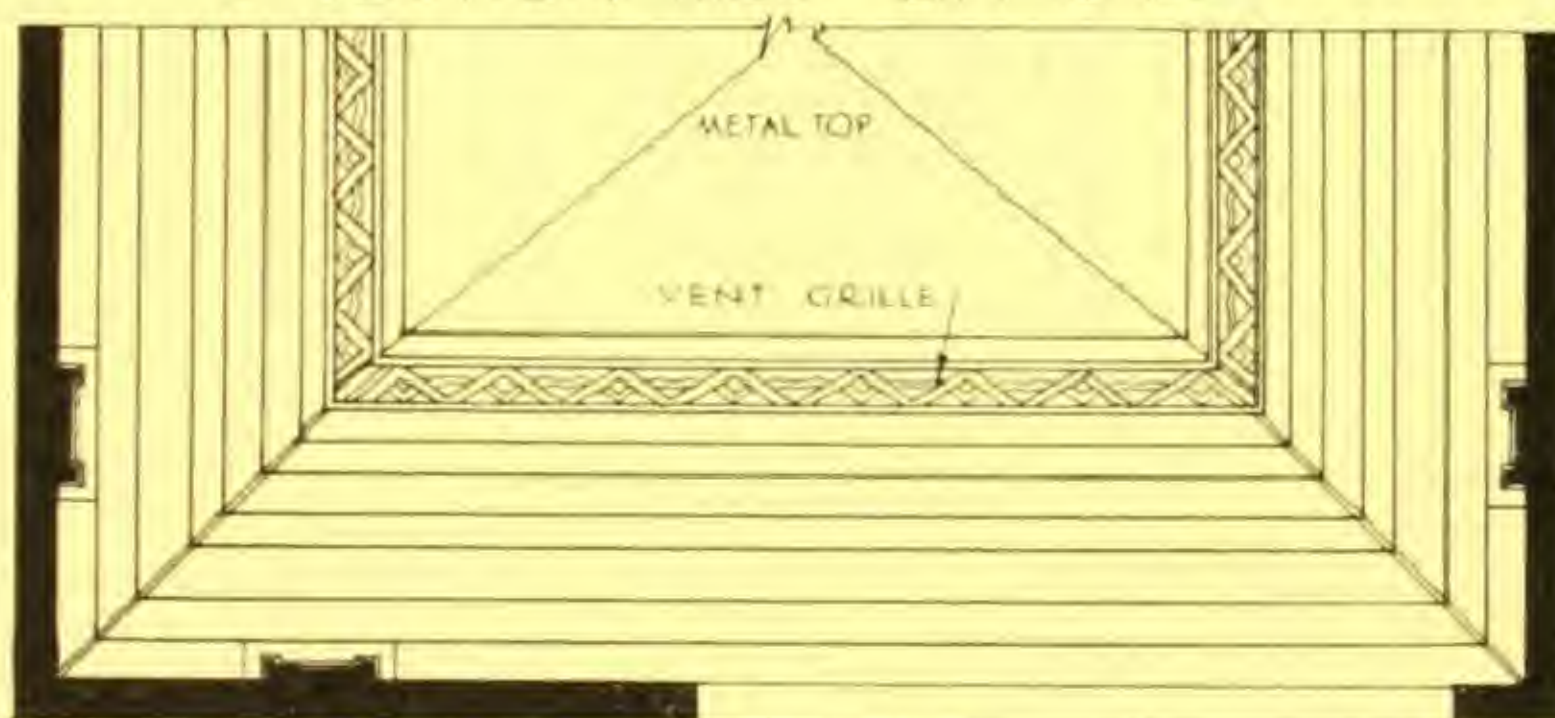
Lift Doorway,  
Bank of Australasia, Collins  
Street, Melbourne.

(Continued on next page)





SECTION THRO' LIFT CAR



METAL PILASTER DOOR OPENING  
PLAN OF CEILING

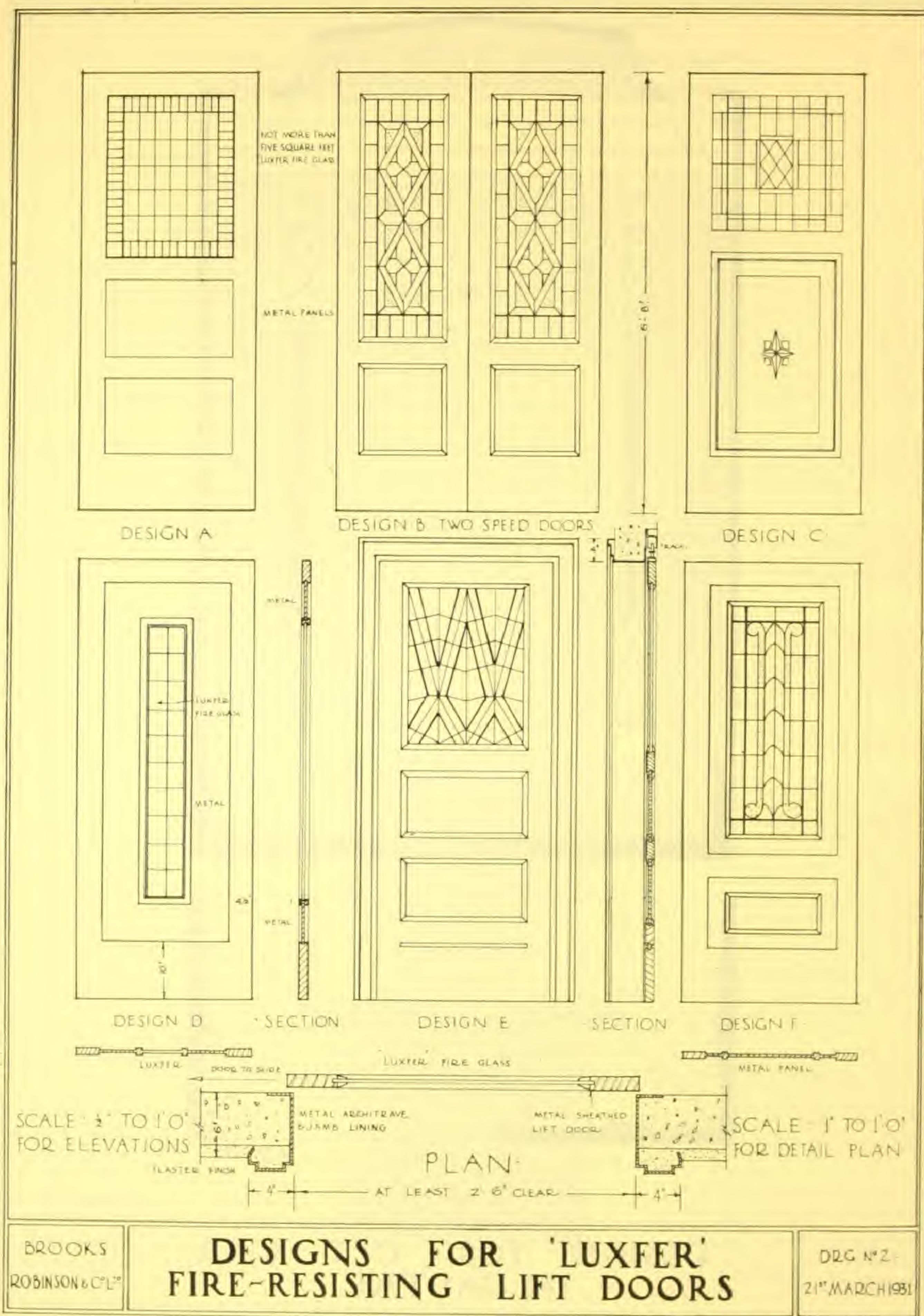
BROOKS  
ROBINSON & CO. LTD.

DESIGN FOR LIFT CAR  
IN METAL

DRG. N° 1  
21<sup>st</sup> MARCH 1951.

(Continued on next page)







## SECTION Q

[Containing S.A.A. Filing Sections Nos. 34, 35 and 36]

## EQUIPMENT





35c

S.A.A. File No.

## A. E. ATHERTON &amp; SONS PTY. LTD.

383 LATROBE STREET, MELBOURNE, VICTORIA.

MANUFACTURERS OF "ATHENA" KITCHEN, CAFETERIA AND HOSPITAL EQUIPMENT

"ATHENA"  
Trade Mark

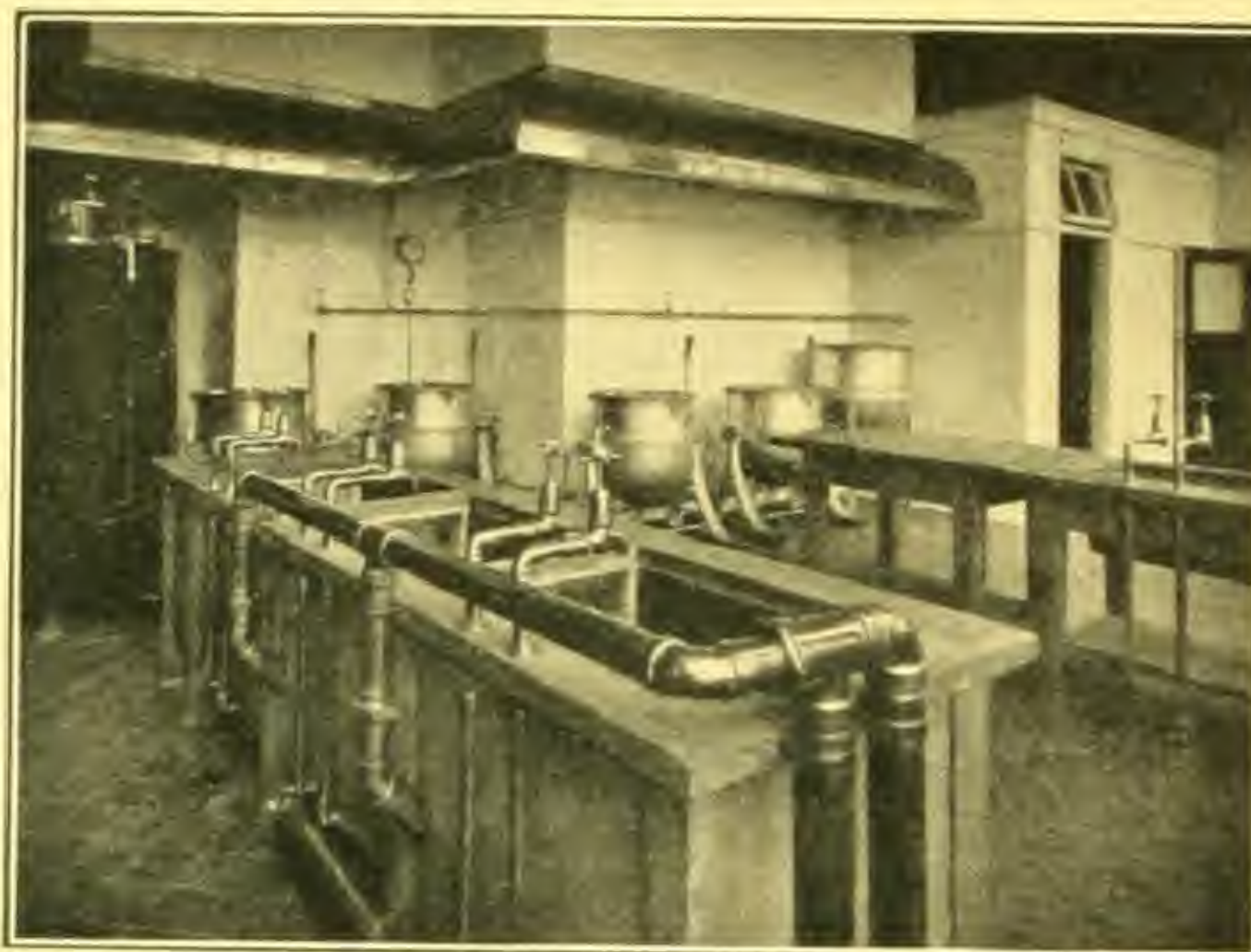
[For Other Products, See Pages 300 and 340]

## KITCHEN AND CAFETERIA EQUIPMENT

## Products

Bain Mariés, Hot Presses, Teapot Heaters, Coffee, Milk and Hot water Urns, Stock Pots (tilting and stationary types), Jet Pots, Milk Coolers, Butter Coolers, Ice Pans, Coffee Percolators, Pie Heaters, Tray Racks, Dish Washers, Sinks, Hoods.

**BAIN MARIÉS.**—Manufactured of Monel or similar metal, can be obtained in any size, with or without hot press under, and with ball-bearing, sliding doors. The top has a number of vessels for keeping food, etc., warm sunk into a heavily tinned trough of boiling water. This water is heated with a steam coil, gas, or electric element.



A corner of the Main Kitchen of the Hotel Alexander, Melbourne.

Leslie M. Perrott, Architect.  
A. E. Atherton & Sons, Installers of Equipment.

## HOT PRESSES

Manufactured of Monel or similar metal, in any desired size, with ball-bearing sliding doors, perforated shelves, steam coils on bottom and under top, thus keeping table warm; gas or electric elements can be used in place of the steam coil.

## COFFEE, MILK AND HOT WATER URNS

Usually cylindrical in shape, or in fancy design if so desired. Sizes to suit any number of gallons. Temperature raised by steam coil, gas or electric element. Obtainable in Monel or similar metal, or copper, nickel-plated, with one or more urn cocks.

Are available in single units, pairs, or batteries of three. These urns may be mounted on heavy pipe stands or warming cupboards, as illustrated.



Combination Bain Marie (Steam Table), with high-backed Warming Closet.

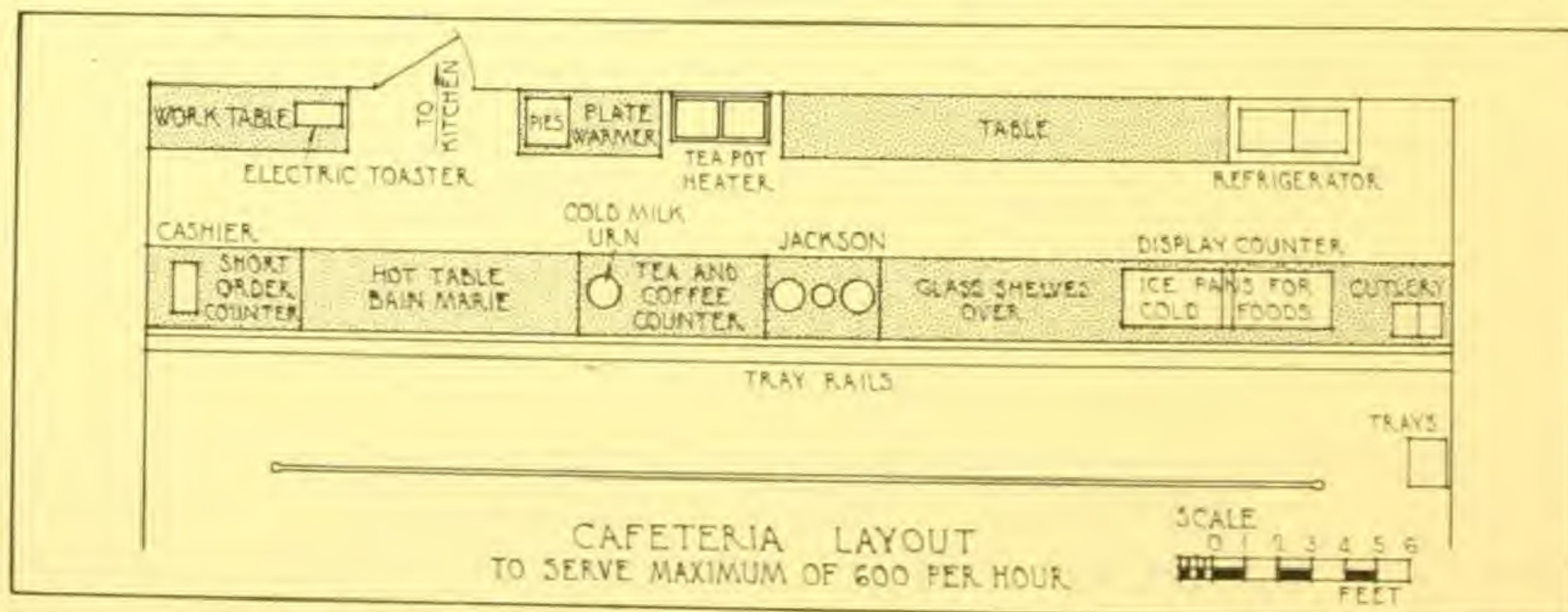
## Service and Facilities

An experience extending over 50 years in installing and maintaining kitchen and cafeteria equipment enables us to design and suggest layouts and methods where maintenance costs can be brought down to a minimum, also to suggest how layouts of various equipment could be improved, and space saved by the actual users.

We are desirous of assisting architects and others who are interested in Kitchen, Cafeteria and Hospital Equipment with all the information on the subject which they desire and which it is necessary for them to have for efficient planning during the very early stages of the building project.



Three-Urn Battery, mounted on Urn Stand and Warmer.



Typical Cafeteria Layout—indicative of the "Atherton" Planning Service.





Steam-jacketted Trunnion Kettle.  
Mounted on a cast-iron trunnion  
and fitted with lever for tilting.

#### STOCK POTS (Tilting or Stationary Type)

Stock Pots suitable for steam pressure from 5 to 30 lbs. pressure, or if a higher pressure is required, pots can be specially made to stand any reasonable pressure.

The inner jacket, which is really the food container, is made of copper and very heavily tinned, and the outer jacket is riveted and sweated to inner jacket, and has all the necessary inlets and outlets brazed where required, and if stationary type, a special urn cock that can easily be taken apart and thoroughly cleaned, is let through the outer jacket into chamber.

The tilting type has a curved lip for pouring purposes, the tilting action is by a gear-turning handle, axles mounted on solid trunnions, with G.M. bushings.

#### JET POTS

The construction of the Jet Pot is similar to a small stock pot with apron extending down, covering jet; jet is fixed in position and the pot is merely placed on it, the ground tapering joint being perfectly steam tight. This means that the pot can be taken away and thoroughly cleaned and sterilised if necessary. Manufactured of copper, nickel-plated and tinned inside, Stay-brite, Monel, or similar metal.



Jet Pot.  
Note Jet alongside, with  
tapering joint.

### THE "ATHENA" DISHWASHER

#### Description

The "Athena" Dish Washer is designed to meet the requirements of cafeterias, hotels, hospitals, etc., where the required dish-washing service is for 1,000 persons per meal. It is of the rack type and of suitable capacity to wash and rinse dishes, glasses and silverware, also sterilising by steam if so desired. It is fool-proof, and will wash delicate tableware thoroughly and economically under heavy service conditions.

#### Washing

The principle of inter-locking sprays is employed for the thorough washing of dishes. This operation is performed by forcing 125 gallons of water per minute at high pressure through eight spray tubes—four below and four above the dish rack. These powerful jets of hot water strike the tableware at all angles, with the sprays inter-locking to ensure quick and thorough removal of all traces of grease and food.

#### Rinsing

The rinsing operation is produced with great efficiency and the minimum quantity of water by eight rinse nozzles, through which the water is distributed and spread in a fine drenching spray over the entire area.

#### Construction

The "Athena" Dish Washer is of simple, rugged and enduring construction, having the following features:—

**Pump** is of the centrifugal type, with single chamber. Connecting shaft of pump and motor is of selected ground stainless steel, run in ball bearings. Pump manifolds and discharge elbows are of best grade cast iron.

**Hood and Tank** are of heavy gauge copper, Monel, or similar metal, with framework of 2 x 2 x  $\frac{3}{16}$  inch angle iron.

Interior is of copper, Monel, or similar metal, bronze and brass throughout. All parts are removable for cleaning. Four spray tubes and four rinse spray nozzles—all of which are removable—are mounted above the rack, with the same number of each mounted below. All valves have renewable discs. Scrap trays are of heavy brass mesh, and guide rails for racks are of the same materials.

**Doors.**—Two lifting doors, one each side of the machine, are of heavy copper and are operated by a smooth and easy lever action.

#### Simplicity of Operation

No experience is necessary for the operation of the "Athena" Dish Washer. The door lever, rinsing and spraying levers are only those used in the actual washing of tableware.

#### Installation

The "Athena" Dish Washer is assembled as a complete unit, including pump, and is delivered ready for electric, water, steam and waste line connection. Installing the "Athena" is as simple as connecting an ordinary plumbing fixture.

#### Data on Athena Dishwashers

Floor Space—	
Length, inches . . . . .	28½
Width, inches . . . . .	28½
Height, inches . . . . .	64
No. Racks Furnished—	
Plate Racks . . . . .	2
Cup Tray . . . . .	1
Silver Tray . . . . .	1
Motor, H.P. . . . .	1
Steam and Water Connections, inches	½
Waste, inches . . . . .	2
Shipping Weight, net lbs. . . . .	650



THE "ATHENA."  
A rack-type Dish Washer.

(Continued on next page)



**"ATHENA" HOSPITAL EQUIPMENT****Complete Hospital Equipment**

An exacting study of the necessary mechanical equipment for the modern hospital has led to the development of the "Athena" line of equipment, which, during the process of manufacture, has had the advantages of skilful and scientific engineering and careful supervision, resulting in the production of sterilizers, etc., of which every part is designed fully to meet its own individual service requirements. The "Athena" line covers a full range of autoclaves, hydro operated utensil sterilizers, oil cushioned instrument sterilizers, bed pan washers and sterilizers, valves, bottle washers, tip-up basins and all mechanical hospital equipment; also hot and cold sterile water plants, both electric and steam automatically operated for temperature.

**Service**

A service department is maintained for the purpose of offering suggestions and co-operation to the architect for the successful planning and installation of all types of mechanical hospital equipment. We will be pleased to prepare sketches of sterilizer room layouts of an appropriate size and character to suit the individual job of the architect.

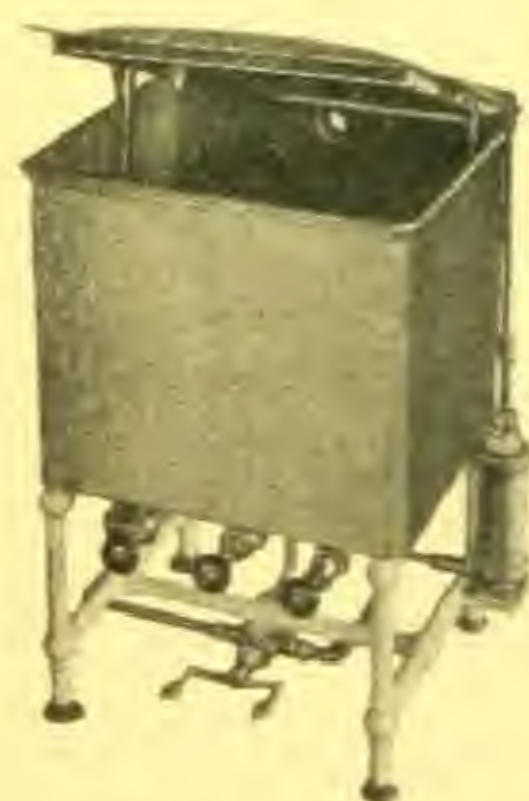
**Sterilizers**

Only selected copper sheets are used in the manufacture of autoclaves and other sterilizers, and where castings are used the best close-grain bronze castings are employed. All castings and copper sheets are finished in nickel plating.

This equipment can also be obtained in either monel metal or other similar metals.

**Hydro Type Utensil Sterilizer**

This sterilizer is entirely automatic, being foot operated by means of a patent valve. When pedal is in the "Raise" position, water passes through the valve into the hydro cylinder, raising the cover which automatically lifts up the tray containing the utensils to be sterilized. When valve pedal is in "lower" position, water is forced back through the waste outlet of the valve, letting cover and tray down gently. Water is automatically cut off by means of the valve on the water supply when cover is opened. This makes the sterilizer positively self operating. The water is boiled by means of steam coil, electricity or gas.



Utensil Sterilizer.



(Closed)



(Open)

Bed Pan Sterilizer.



Instrument Sterilizer.

**Oil Cushion Instrument Sterilizer**

Is absolutely protected against water pollution by the sterilizer. Made of bronze, brass and copper, N.P., and mounted on a white enamelled pipe stand, and provided with a mechanical pedal lift for operating cover. An oil check prevents seaming of cover. It has a large drain covered with a removable screen, and is fitted with one full-length and two half-length trays. Steam coil and all necessary special heavy duty valves for hand control of water supply, waste and steam are installed complete.

**Finish.**—Exterior highly polished nickel; interior heavily tinned. Stand is white enamelled, or other colour if desired.

**Overall Dimensions.**—3ft. 2in. high, 20in. long, and 14in. wide.

**Auto Clave Sterilizer**

This is a steam-jacketted sterilizer made from bronze, brass and copper, mounted on tubular steel pipe stand. Vacuum and automatic air and condensation elimination ensures perfect steam penetration and quick drying.

The operation of the sterilizer is controlled by three valves only. All necessary gauges, safety valves, complete with steam coil heating equipment, with special heavy duty type valves for hand control, are installed. One instrument tray is provided.

Provision is made for atmospheric steam, air and condensation exhaust into piping system in accordance with most exacting codes.

**Finish.**—Exterior of exposed sterilizer is highly polished nickel; interior is heavily tinned. Exposed stands are white enamelled or finished in other colours if desired.

Exposed parts of built-in sterilizer are highly polished nickel. Sides of the concealed body are covered with air-cell asbestos held in place by treated canvas. Built-in stands are varnished aluminium.

**Bed Pan Sterilizer**

The pan is thoroughly washed and sterilized in the one operation; the pan comes out dry and ready for racking or further use. The sterilizer is cylindrical in shape, being 18 in. in diameter and approximately 3 ft. high, and is connected to the sewer system with a 3 in. soil trap water connection. The pan is washed by a flushometer, the water being sprayed, through a perforated rose washing pan, inside and out. A flooding ring is also set around top of sterilizer for the purpose of cleaning sterilizer while the pan is being washed. Spray for this connection is taken from the flusher.



### Milk Bottle Sterilizers

Made of bronze, brass and copper, mounted on white enamelled pipe stand. Mechanically foot-operated lift for cover only, with oil check to prevent slamming of cover.

One complete set of bottle racks; complete heating equipment, and all necessary special duty type valves for hand control of water drain and steam supply.

Larger sizes have cabinets underneath for bottle storage. Water filling pipe is above level of overflow, thus meeting the most exacting codes.

**Finish.**—Exterior highly polished nickel; interior heavily tinned. The bases of the two larger sizes and all pedal mechanism are finished with hard black enamel; stands of three smaller sizes are white enamelled, or of other colour if desired.

### Installation of Sterilizers

Our service department will give all information regarding the sizes and nature, lines and fixtures of plumbing and steam lines, etc., necessary to suit the capacities of the various sterilizers that are installed. Furthermore, we will prepare detailed layout that will show the complete installation of all lines, connections and fittings, etc., required for the perfect functioning of sterilizers.

### Bed Pans

Bed pans manufactured from monel metal are available. The use of this material ensures their resistance to the heavy service met in daily hospital use. They are not affected by sterilizing solutions, and are entirely corrosion resisting.

### Blanket and Bed Pan Warmers and Solution Cabinets

Cabinets are made from rust-proof terne plate and are lined with asbestos cement board for heat insulation. Doors are hung on ball-bearing hinges and are equipped

with eccentric or bar-locks to ensure tight closing of door, which renders the cabinet dust-proof. Complete heating equipment is located so as to provide for uniform distribution of heat. If electrically heated, blanket and bed pan warmers will be controlled by a toggle switch without thermostatic regulation of temperature.

Solution warmers and solution compartments of warmers are controlled by an accurate thermostatic device which automatically regulates the temperature.

### Food Waggon

Food waggons manufactured from monel or similar metals and silver frosted sheet steel are available. They are thoroughly insulated and fitted with electric heating elements. Waggons are provided with drop doors which can be used as a table for dishes, etc., when emptying or refilling.

All waggons are mounted on specially constructed hospital type swivel spring socket ball-bearing tyred wheels, which make them very light to handle.

### Trays

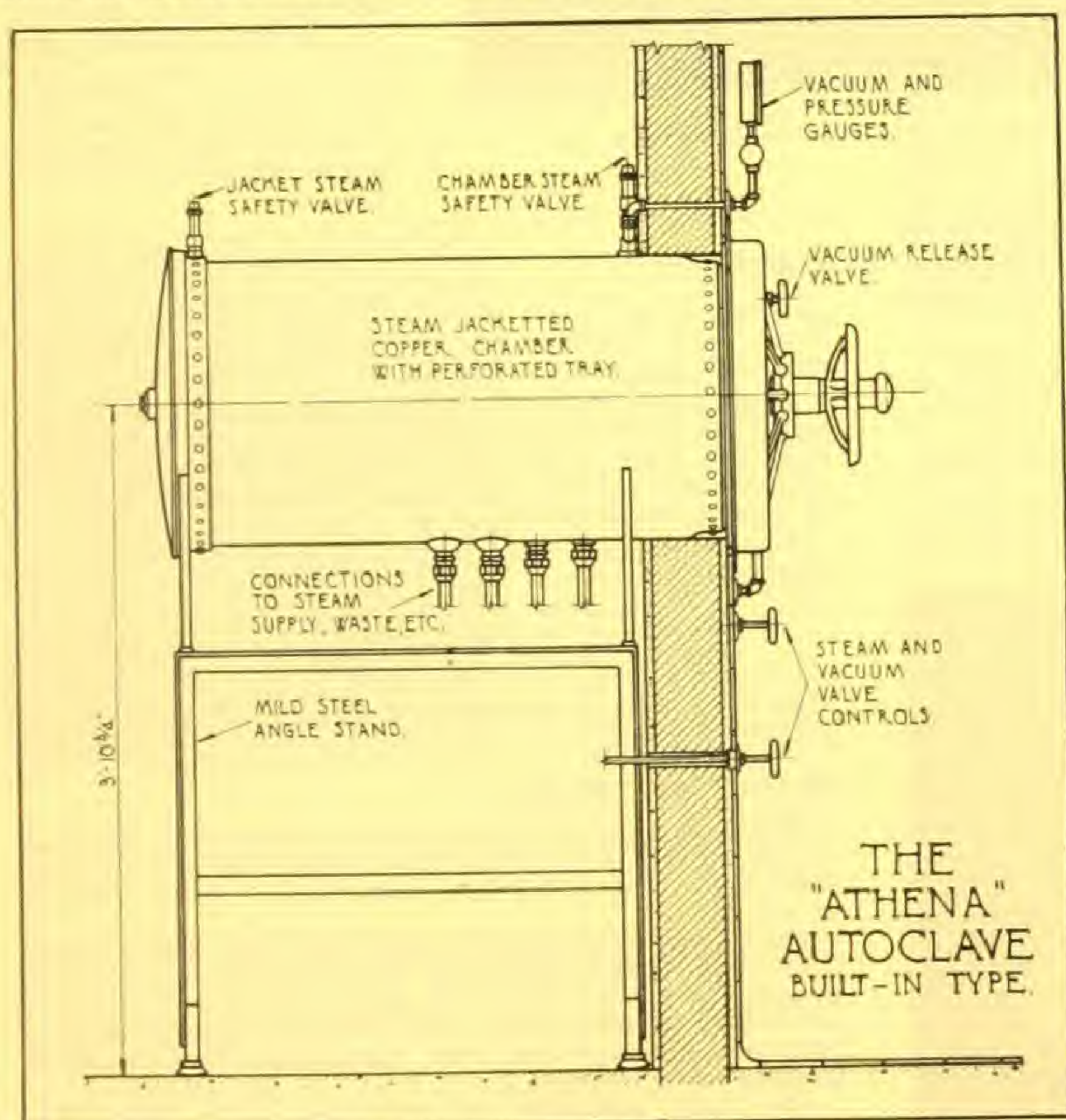
We have a wide selection of tray racks, dish racks, utensil racks and linen trucks, all of which are constructed with monel metal, and mounted on special hospital rubber-tyred wheels.

### Sinks

Sinks of Monel, Silveroid or similar metal are available. These have a glass-smooth surface that resists the attacks of food and fruit acids—a surface that can be kept bright and clean with ordinary care. They are rust-proof and chip-proof, with a steel-like strength and toughness.

Some features of metal sinks:—

- (1) Rust-proof, highly resistant to corrosion and strong as steel.
- (2) Solid metal clear through, with no coating to chip, crack or wear off.
- (3) Obtainable in any size or shape.
- (4) Less weight, saves labour expenses in installing.



Built-in Autoclave Sterilizer as supplied to the Children's Hospital (Orthopaedic Section), Frankston, Victoria.



# GARDNER & NAYLOR PTY. LTD.

Domestic Engineers

Offices and Showrooms:

34 QUEEN STREET, MELBOURNE.  
Tel. C.3290.

Works:

304-308 SPENCER ST., MELBOURNE.  
Tel. F.3679, 3670.

35c

S.A.A. File No.

G  
&  
N

[For Other Products, See Page 333]

## Products

Special equipment for Kitchens, Cafeterias and Quick Lunch Counters of all descriptions, including Dish Washing Departments.

## Importance of Kitchen and Cafeteria Design.

**General.**—The important factor in designing a Kitchen, Cafe or Cafeteria layout is not so much to find space for a fitting, as to place it in such a position as will suit the proper sequence of operations.

Messrs. G. & N., from their very wide experience of this type of work, are able to develop each cycle of operation, so that all movement is natural, unobstructed and progressive, leading right from the entrance of the raw material to the point at which the finished article is taken from the servery.



Typical Double Service Kitchen Installation.

## Experience in Manufacture

Gardner & Naylor have supplied equipment throughout Australia and New Zealand, the following being some of the larger kitchens which they have designed and installed: "Argus" Office, Athenæum Club, Buckley and Nunn, George and George, British Aust. Tobacco Co., New A.M.P., Melbourne, Scotch College, Geelong College, and many hospitals, hotels, etc.; Cafeterias and Quick Lunch Service Counters for G. J. Coles & Co. Ltd. at new Bourke Street "Arcade" premises, Swanston Street, old Bourke Street premises and two large installations at Pitt Street, Sydney, premises; Messrs. Farmer & Co., Sydney; Messrs. Griffiths Bros., Melbourne (three cafes), also Sydney, Brisbane and Adelaide. A large amount of equipment has been supplied to the Myer Emporium Ltd., both Melbourne and Adelaide; the Victoria Palace, Melbourne. A large proportion of the refreshment room kitchens for the Victorian Railways have been equipped with G. & N. fittings.

## KITCHEN EQUIPMENT

### Steam Jacketted Pans

These fittings are manufactured in 15, 20, 25 and 30-gallon capacities, and may be either of the tilting or fixed type. The standard fitting has a monel metal interior, with the exterior nickel-plated, and is designed to operate at steam pressures up to 15 lbs. per square inch.

A plain copper fitting with tinned interior can also be supplied. This fitting, which can also be supplied for

gas operation, may be used for cooking vegetables, stews, soup, porridge, etc. A balanced lid of N.P. finish may be supplied if required.

If the fitting be of the tilting type, it is fitted on two trunnions, through which the steam and exhaust connections are taken. The pan is tilted by means of a hand lever for the smaller size. Larger sizes are tilted by means of wheel-operated tilting gear.

The dimensions of the standard fitting, over the trunnion mountings, are:—

- 15-gallon—23 in. x 21 in. diameter.
- 20-gallon—30 in. x 22 in. diameter.
- 25-gallon—32 in. x 24 in. diameter.
- 30-gallon—34 in. x 26 in. diameter.

Steam jacketted pans can be supplied with cantilever brackets or stand.

### Steam Oven Cookers

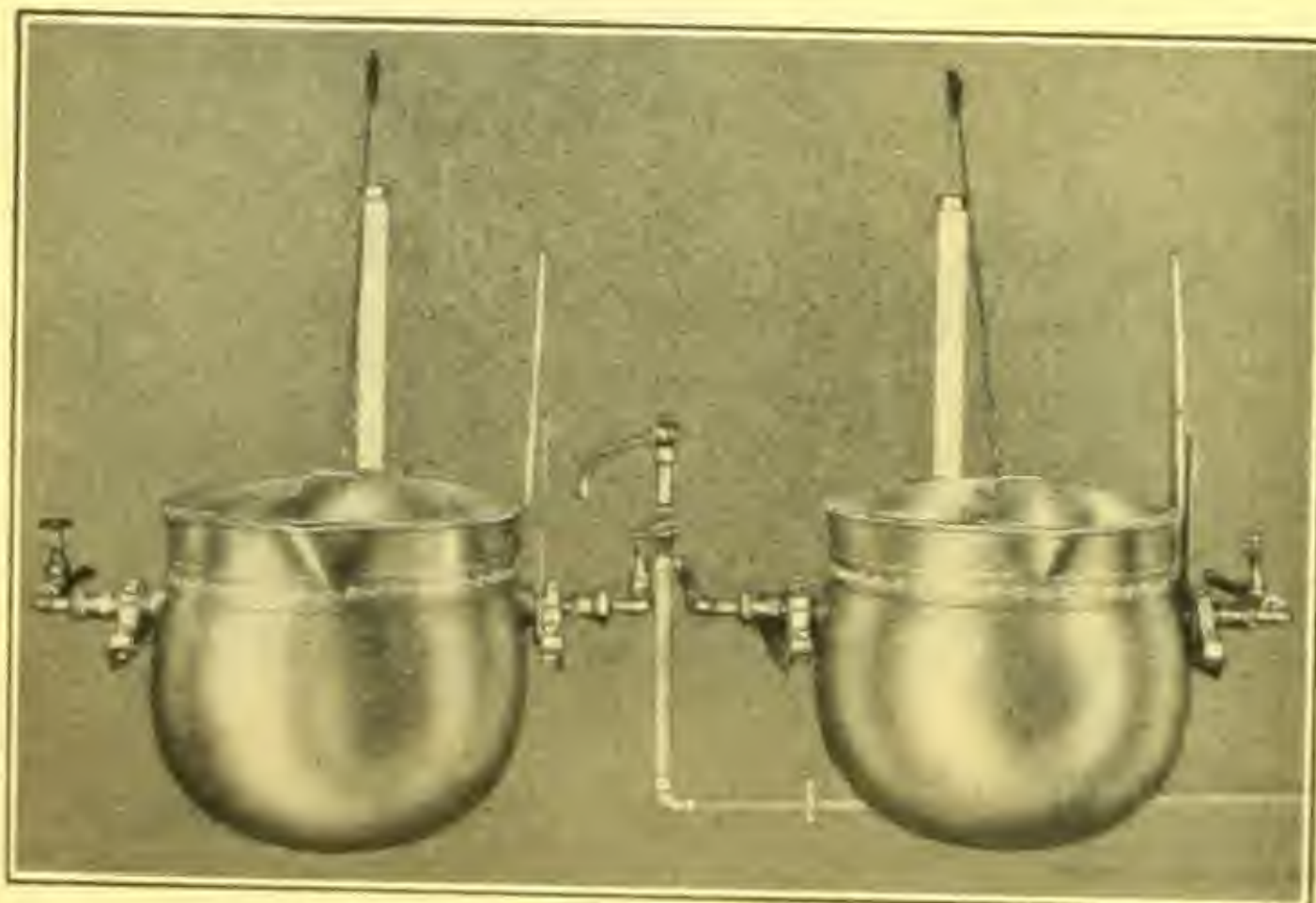
This fitting can be supplied in two and three oven sizes.

The overall sizes of the steam cooker are: 2 ft. 4 in. wide, 2 ft. deep; the height is dependent on the number of ovens.

The general construction is heavy cast iron, with wrought steel casings; the steam-tight doors are swung on heavy hinges, and are provided with special door tightening gear and rubber insertion seat. This fitting is used for steaming potatoes, puddings, fish, etc., galvanized wire vegetable baskets being supplied.

The steam pressures up to 15 lbs. are suitable, each compartment being under separate steam control, so that

(Continued on next page)



Steam Jacketted Tilting Pans.



### Steam Oven Cookers (Cont.)

each can be used for separate purposes. The contents are cooked or steamed by free steam, which fills the compartment.

The waste from each oven is fitted with a check valve. The combined waste must be fitted with steam trap. This fitting can also be supplied for gas operation.

### Ovens and Boiling Tops

These can be supplied for either gas or electric operation. Electric fittings, while more expensive to install, are finding favour because of their cleanliness, ease of operation and even and constant heat. Electric operation requires less ventilation, and has special and peculiar advantages under certain conditions.

Gas ovens and boiling tops are used extensively, and are less costly to install.

Thermostatic control of ovens is a great advantage in both gas and electric operation.

### Baking Ovens

Special ovens for baking and pastry are available for both gas and electric operation. These fittings are designed so that the heat is evenly distributed over the whole oven, which is efficiently insulated. Units can be supplied consisting of one, two or three ovens, according to the requirements of the kitchen. Automatic control of the oven temperatures is of great assistance in the operation of baking ovens.

For quantity production, coke or oil-fired steam ovens are most efficient.

### Ranges

Ranges are available in varying sizes suitable for either coal, coke, wood or oil fuel.

Wall types can be supplied in single units up to 8 ft. long, with three ovens. Table ranges vary in size from two to six ovens, and can be arranged, if necessary, with flue carried under the floor instead of overhead to the main stack. Ranges usually require special flues built into the construction.

Oil-fired ranges have now proved themselves, the advantages being:—No stoking required, quick heating from cold, no dirt and smuts, easy control of the fire.



Six Vessel Jet Pot Table.

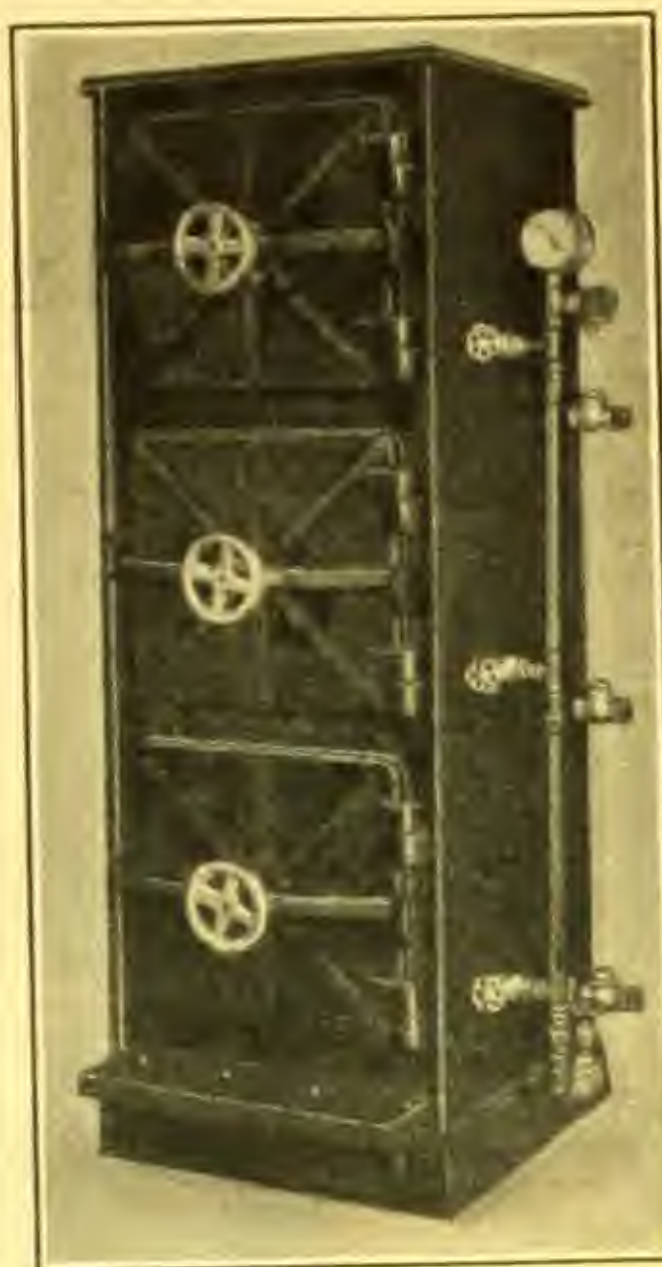
is fitted at one end of the table, from which each pot may be controlled. Exhausts are collected from each jet pot into one main pipe. This must be run to waste and fitted with steam trap.

Two standard Jet Pot Tables, viz.:—three fittings, with one 1-gallon, one 2-gallon, one 3-gallon pots, and six fittings, with two 1-gallon, two 2-gallon and two 3-gallon pots.

Dimensions of three-fitting jet pot table—4ft. 6in. x 1ft. 8in.

Dimensions of six-fitting jet pot table—4ft. 6in. x 3ft.

Uses.—This fitting is used for preparing soups, sauces, custards, boiled puddings, etc.



Three Oven Steam Cooker.

### Hot Presses

These are for keeping prepared food and plates from the kitchen hot until served, and are usually constructed in sizes to suit their location, and the space available. The usual sizes are:—6ft. x 3ft., 9ft. x 3ft., 12ft. x 3ft., but these dimensions can be varied to suit.

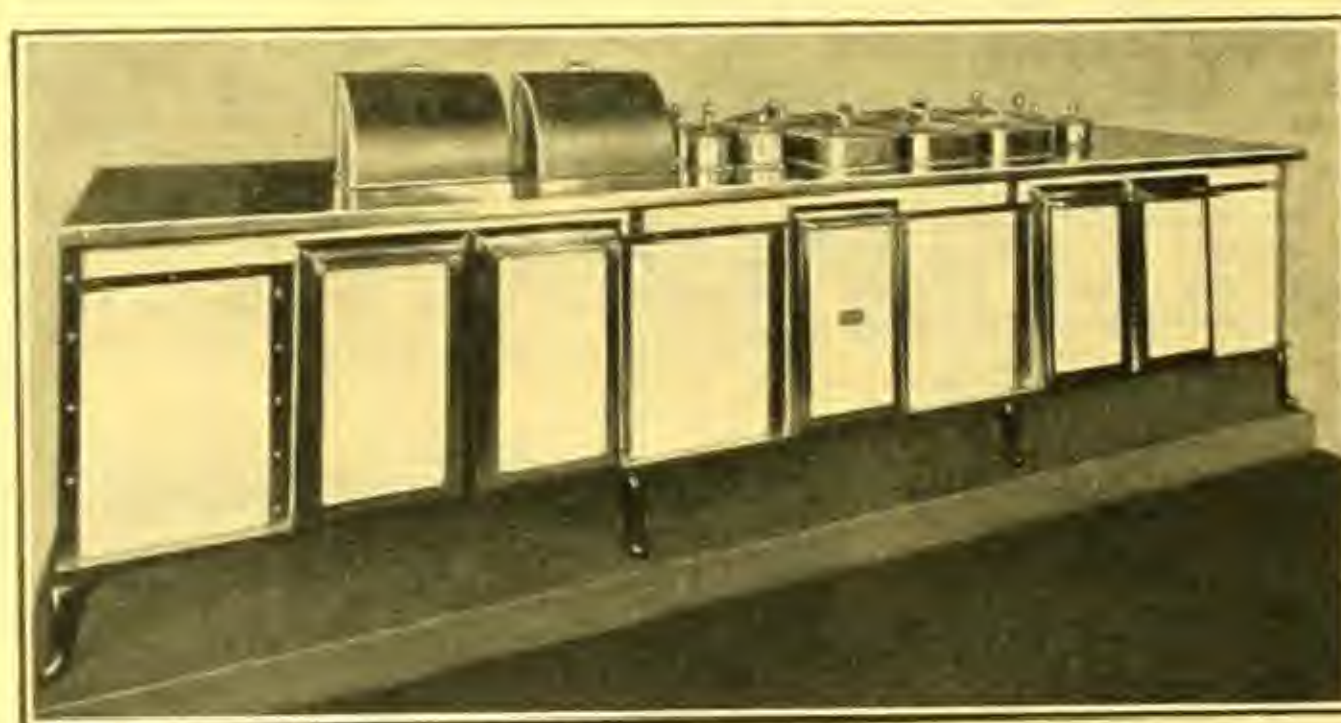
The heated service top is usually polished Monel metal, into which carving wells of Monel metal can be fitted, usually having a quadrant cover. The hot press interior has two shelves independently heated, and sliding ball-bearing doors are fitted on one or both sides of the press.

The panels and doors are finished in white enamel with nickel-plated cover strips and trimmings, the whole unit being fitted on legs.

### Bain Maries

A Bain Marie is often fitted in the Monel metal top of the hot press and consists of a tank, containing boiling water, heated either by gas or steam, into which vessels containing soup, vegetables, and the like are placed through holes and held by a flange, the boiling water keeping the foods hot until they are required for service. The Bain Marie vessels, which can be supplied either round or rectangular, are usually constructed of Monel metal. The bottoms are rounded to facilitate cleaning. It is also possible to use food vessels of copper, with tinned interior. Provision is made to fill and drain the tank.

Bain Maries are sometimes used as a separate fitting when they are placed on a bench or stand. These fittings can be operated by steam, gas or electricity. Open type Bain Maries suitable for warming pots and cooking vessels of any shape can be supplied.



Twelve Foot Hot Press with Bain Marie Vessels, Quadrant Covers over Carving Wells, and Monel Metal Top.

### Grillers

These fittings are used for grilling steaks, chops, etc., and may also be used for bread toasting, and are designed to stand on a bench, special stand, or cantilever brackets.

Gas or electric fittings are available with either top or side heat.

### Toasters

Available for both electric and gas operation. Electric toasters are finding increased favour because of their cleanliness and even heat, and are also particularly suitable for automatic operation. These can be supplied in units which will take a number of slices of toast, each slice being toasted automatically, the current being switched off at the time set.

Small Hot Cabinets for keeping toast hot until served are incorporated in certain types of toasters.

### Fish Kettles

Standard fittings for electric or gas operation are available, and provision can be made, as required, for draining, and with special hot closets for plates and storage for short order work.

(Continued on next page)



## Urns

Urns are manufactured in standard sizes from one to ten gallons for either gas, electric or steam operation.

Standard fittings are constructed of heavy gauge copper with tinned interior and nickel-plated exterior, nickel-plated domed lid and draw-off cock. Milk and coffee urns are water-jacketed and have special interiors of cupro-nickel alloy or earthenware, the draw-off taps being of special design to facilitate cleaning.

When urns are to be used especially for coffee, rings are supplied for coffee bags.

Electric urns are provided with three heat control and automatic safety cut-out.

## "Invincible" Pie Warmer

"Invincible" Pie Warmers, for gas, electric or steam operation, are constructed with frame and trays of sheet steel and casing of heavy-gauge, hard-rolled copper, nickel-plate finish. An efficient insulation surrounds the warmer, which greatly increases its heating efficiency.

All trays are interchangeable and are fitted with neat N.P. face and knob handle.

Electric Pie Warmer heating elements are provided with three-heat control.

## "Invincible" Dish Washer

The "Invincible" Dish Washer manufactured in our works, at Therry Street, has been installed in hundreds in kitchens, cafes, etc., throughout Australia and New Zealand. This high-quality machine, the first of its kind manufactured in Australia, has a capacity greater than 3,000 pieces per hour washed, sterilised and dried in a hygienic manner.

The standard machine is constructed mainly of heavy gauge hard-rolled copper. Monel metal machines, as illustrated, are also used extensively.

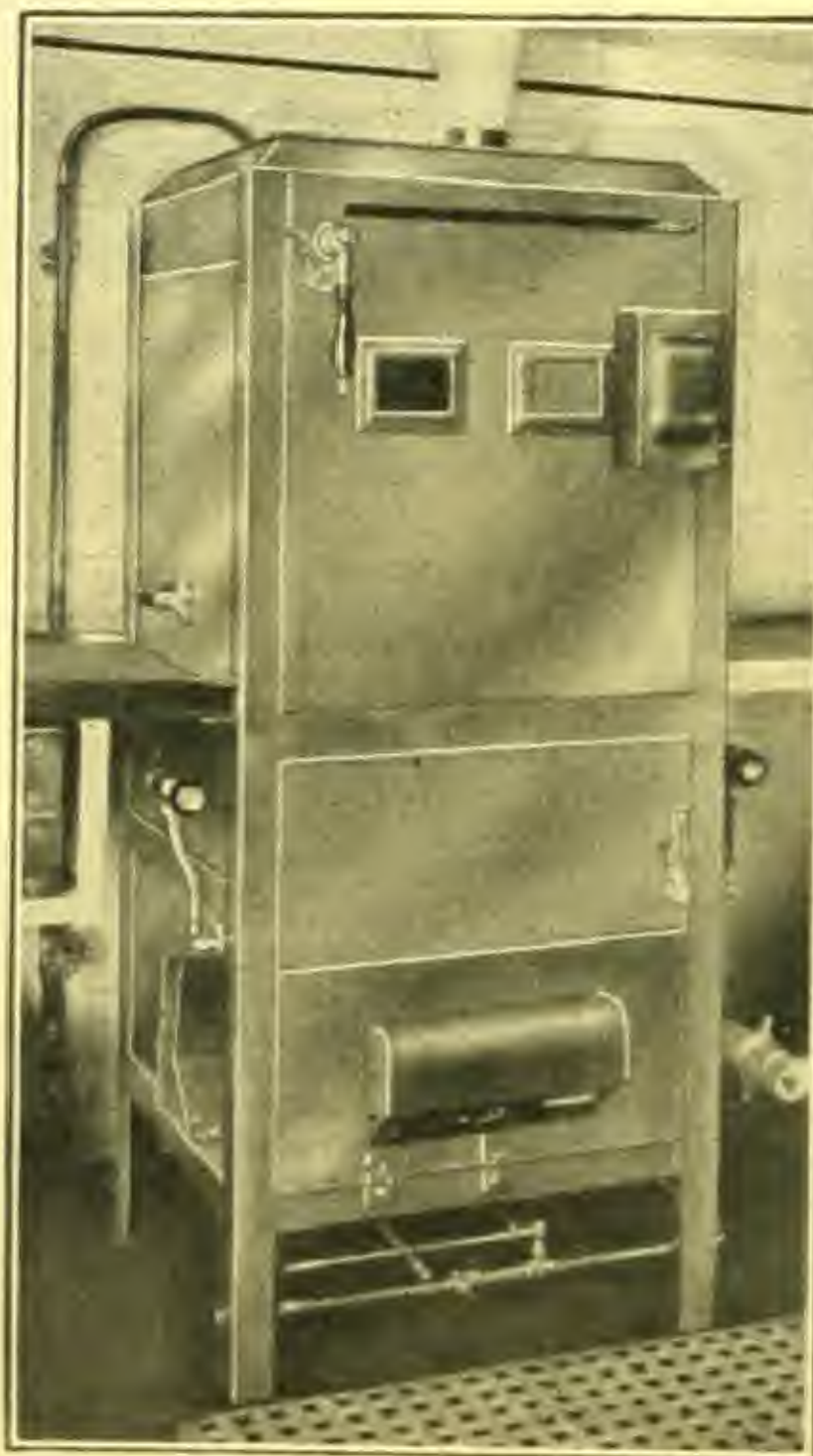
The balanced doors of the machine are raised and lowered by means of a lever, the movement of which requires little effort, the hands of the operator not being exposed to the hot vapours as the doors open.

A motor-driven pump, rotating washing arms, sterilising sprays, patent quick-acting spray valve and sturdy construction are features of the machine which is supplied complete with six trays for dishes, cups and cutlery.

Dimensions — 2 ft. 4 in. wide x 2 ft. 2 in. deep x 5 ft. 2 in. high. Send for Descriptive Pamphlet.

Dish Washer Draining Boards are usually constructed of heavy-gauge Monel metal fixed by a special holding-down process. The tops are carefully graded to prevent water from lodging in low spots. A raised nosing is carried round the edge of the metal top, which serves as a guide for the dish washer trays, and prevents water from draining on to the floor. The top is supported usually on flanged pipe standards of galvanized or N.P. finish.

Draining tops may be also supplied of plain kauri. The standard width of the draining boards are 2 ft. 2 in. overall, although this measurement can be varied slightly.



"Invincible" Dish Washer,  
Monel Metal Construction.

## "Invincible" Cafe Fountain (For Gas Operation)

This fitting, which has been used extensively throughout Australia, is designed to supply fresh boiling water only for tea making in cafes, cafeterias, large kitchens, etc. It consists, essentially in the lower section, of an efficient gas boiler — the upper N.P. column houses an expansion arrangement so designed that only boiling water can be drawn.

The construction is heavy-gauge, hard-rolled copper, interior tinned. All parts appearing above the counter are N.P., including a copper cold-supply tank housing the ball valve, which makes water supply automatic.

An outstanding feature of the "Invincible" is the large and efficient heating surface in the boiler, making it well suited for heavy and continuous service.

The "Invincible" Cafe Fountain is made in two sizes.

A smaller edition of this fitting for gas operation is the "Invincible" Counter Boiler, which is suitable for fixing on the top of a counter.

A Monel metal top and drip tray is supplied with the Fountain.

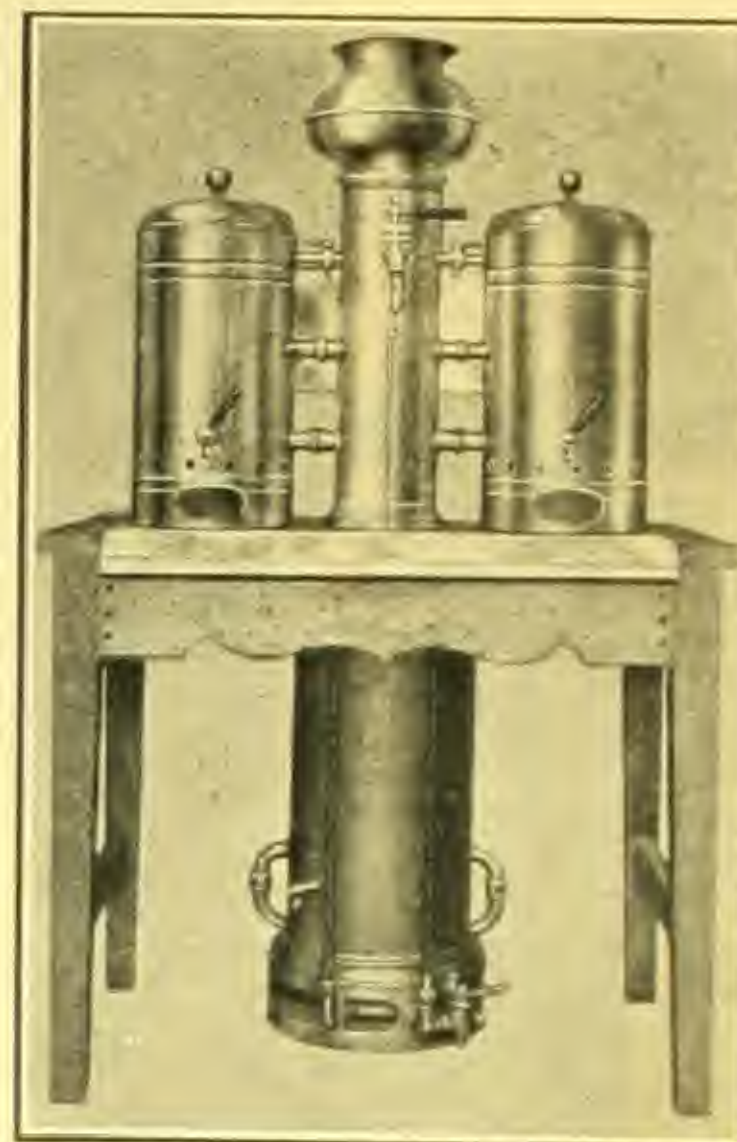
## "CALORIC" CAFE FOUNTAIN

This is a steam-heated fitting, other features being the same as the "Invincible" Fountain. The "Caloric" will deliver a constant stream of boiling water.

"Caloric Junior" steam-heated Cafe Fountain is a smaller model of the "Caloric."

Water-jacketed urns for milk and coffee may be connected to the fountain, as illustrated.

Send for Descriptive Pamphlet.



"Invincible" Cafe Fountain  
with Water Jacketed Urns.

## Monel Metal Sinks and Draining Boards

Monel Metal Sinks and Draining Boards, constructed of heavy-gauge Monel metal are supplied of various sizes. The finish of the sinks and tops is of a special nature, nicely rounded corners in the sinks being a feature. The tops are supplied with stands to suit the location. Light type Monel metal sinks can also be supplied.

### TEAPOT RINSE

This fitting, which is circular, is fitted flush with sink top. The main cylindrical container is constructed of Monel metal with an internal perforated strainer for collecting the refuse leaves. This is removable for cleaning. A press-down valve, fitted with an ebonite knob on to which the inverted teapot is pressed, operates the flushing sprays, which wash the pot both inside and out.

The standard teapot rinse, which is 9 in. diameter, requires waste and water connections.

Vegetable Paring Machines can be supplied in capacities from 15 lbs. to 40 lbs. of potatoes, etc. These machines will thoroughly pare and wash the vegetables, leaving them in their natural shape and in a smooth condition. This machine requires water and waste connections; electric connection from a power-plug is sufficient.

Electric Mixing Machines, which can be supplied in capacities from 10 quarts, are suitable for dough mixing, egg beating, cream whipping, potato mashing, etc., etc.

Bread Cutting Machines can be supplied of the adjustable type and may be fitted with buttering attachment.

### COOLING CHAMBERS AND CABINETS

This equipment has been developed by Gardner & Naylor of standard sizes and proportions which have been found most suitable and efficient for quantity and speedy operation. In the latest models the horse-power required for operation is one-third that necessary for the type of equipment of even a few years ago. The insulation used is of a specially efficient nature.

(Continued on next page)



## CAFETERIA EQUIPMENT

## Design of Cafeteria

Every Cafeteria installation has its own peculiarities, due to differences both of type of service adopted, and local conditions, and requires careful and independent consideration, in order that the maximum efficiency is to be obtained from the plant. By means of careful planning, it is possible to utilise the available space to the greatest possible extent, and to reduce operating costs to a minimum. The following points require consideration, in order to obtain speedy service and maximum efficiency and return:—

Main thoroughfare from entrance (or elevator) to service counter, exit from counter to cafeteria space, relation of preparation room and kitchen to main service counter, position, size and design of dish-washing room, and probably the most important of all, the design of the main service counter and back benches.

Gardner & Naylor's equipment is designed in the light of many years of experience gained in the supply and installation of cafeteria equipment of all descriptions throughout Australia.

## Equipment

## CAFETERIA AND QUICK LUNCH SERVICE COUNTERS.

The framework is sturdily constructed of metal throughout. The advantages of the steel frame construction are—strength, speed of erection, the space not long out of revenue-producing condition during change over—easily removed and refixed—space saved, as more shelving possible with steel construction—permanent, no decay—easily cleaned.

The top and front of counters have a non-absorbent surface, and are manufactured in standard sections of length found most suitable for all conditions. This is a decided advantage in that they can be taken down and re-erected in a very short time, and at little expense. Counters also may be shortened or lengthened by removing or adding sections, with little difficulty. The exterior finish would be in keeping with the dominant decorative motif. The panels can be of steel, porcelain enamelled in various colours, marble of various shades and types, or tiles.

**BACK BENCHES** provide extra working and shelf space behind the main service counter, usually constructed of Monel metal or other cupro-nickel alloy, and fitted on N.P. flanged standard legs. If sinks and other extra equipment are required, they are usually fitted in back bench.

## FOOD DISPLAY CASES.

Standard Gardner & Naylor display cases are of rigid construction, consisting of plate glass shelves and protective fronts, supported by N.P. columns, which are firmly stayed by N.P. rods and mountings. The cases, which are made in standard sizes to suit the service counters, are three or four tiers high, and one to four sections long, according to the type of counter.

The design of these fittings conforms to the best hygienic standards.

## WARMERS.

The following fittings can be supplied:—

**PIE WARMERS**, of capacity suitable for the service required.

**SAVELOY WARMERS**, including plate-warming cabinet.

**SOUP BAIN MARIES**, with inserts of number and capacity for the menu decided on, together with bowl warmers.

The above fittings may be operated by either steam, gas or electricity.



Cafeteria Service Counters.  
Completely designed and installed by Gardner & Naylor.

of the heaviest description, are most suitable for this work. Water-jacketed Urns connected to the Fountain provide milk and coffee and cocoa, if necessary, and have special interiors to stand the heavy service.

## SALAD PANS.

These are provided in the service counters for cooling salads, etc., for direct service, and may be either ice or refrigerator cooled.

## MILK COOLING CABINETS.

These are supplied complete with milk pump, and are provided with polished metal top, heavily insulated cabinet, and may be cooled either by ice or mechanical refrigeration.

## SODA FOUNTAINS.

These are provided, where necessary, of size and type to suit the type of service; supplied complete with carbonator, refrigerating unit, syrup containers with syrup pumps, soda arms, and special polished metal top.

## ICE CREAM CABINETS.

Supplied in variable sizes, complete with polished metal top, specially insulated walls and lids, and air-cooled type compressor unit built in as an integral part of the cabinet.

## REFRIGERATING CABINETS.

Service cabinets are usually fitted in main service counter for cooling foods such as jellies, custards, cream, etc., for direct service over the counter. Storage refrigerating cabinets are fitted either in the preparation room or kitchen, dependent on the layout and size of establishment, and are of sturdy construction, with walls, floors and doors heavily insulated. Air-cooled type compressor units are used for cooling the cabinets.

QUICK LUNCH  
COUNTER SEATS.

These are designed to withstand heavy and continuous service, and can be supplied both with and without back-rests, revolving or fixed. The base and column are of heavy cast iron, white enamel finish, and of neat design. Foot-rests and mountings are heavily nickel-plated.

SUBVEYORS AND  
CONVEYORS.

In cases where the dish washing room and kitchen are some distance from the cafeteria service counters, it is frequently found advantageous to provide food and soiled dish conveyors.

(Continued on next page)



Quick Lunch Service Counter.



## HOSPITAL EQUIPMENT

It is essential that the design and manufacture of, and materials used in hospitals, and especially sterilising equipment where correct operation is so vital, be such as to result in products of the highest standard. Strong construction and careful workmanship mean uninterrupted service, which is essential in hospital routine.

Gardner & Naylor sterilising equipment, manufactured at the works in Therry Street, Melbourne, has been proved by constant use in hospitals, both large and small, throughout Victoria, for a number of years—such equipment has been installed in hospitals such as: The Alfred Hospital, Austin, Children's, St. George's Intermediate, Queen Victoria, Caulfield Military Base, Fairfield Infectious, Mont Park, and District Hospitals at Bendigo, Ballarat, Geelong, Mooroopna, Horsham, Hamilton, Warrnambool, Wangaratta, Swan Hill, Mildura, Warragul, etc., etc.

In most of the hospitals in the foregoing list, the steam, hot water, kitchen and sterilising equipment was installed by Gardner & Naylor. In many cases, the complete laundry equipment was also carried out by this firm.

#### G. & N. HIGH-PRESSURE DRESSING STERILISERS (AUTOCLAVES).

High-pressure horizontal sterilisers for steam, gas or electricity.

It has been established that steam at a pressure of 15 lbs. per square inch, or more, not mixed with air, thoroughly permeating an article for five to ten minutes, will render such an article sterile.

The Gardner & Naylor standard, high-pressure, Dressing Steriliser is designed to operate under these conditions, and consists of an inner sterilising chamber constructed of heavy-gauge planished copper, with tinned interior, surrounded by a steam jacket of similar construction.

The massive door and frame are constructed of cast bronze, with a special seating and machined face to stand the necessary pressure. The door-tightening mechanism, consisting of screw gear and locking bars, are of steel and bronze. The ball-bearing door hinge is adjustable for wear, and eliminates door sagging.

Vacuum or air eliminators ensure that the air is removed from the chamber for complete sterilisation.

Other standard equipment includes safety valves, steam and vacuum gauges, control and relief valves. Sterilising caskets, and a framed waterproof copy of operating instructions are supplied with each steriliser.

These fittings, which are suitable for operation with steam, gas or electricity, are manufactured in standard sizes, the dimensions of which are:—

- 15 in. diameter x 24 in. long;
- 18 in. diameter x 24 in. long;
- 21 in. diameter x 24 in. long.

These three fittings can be supplied 30 in. long.

Panel Type Dressing Sterilisers, where possible, to be used, are an improvement on the exposed type, in that the whole of the steriliser body is built in behind a wall, the face of which is usually tiled or panelled in Monel metal, only the frame of the steriliser door being exposed, the valves, pressure gauges, etc., being arranged neatly in a panel on the face of the wall (see illustration).

Exposed Type Dressing Sterilisers.—If exposed type, this fitting is supplied with white enamelled pipe stand.

The steriliser body and mountings are all heavily nickel-plated and titling and placing of controls is natural and convenient to operate.

Gardner & Naylor Dressing Sterilisers can also be supplied in Monel Metal.



High-Pressure Dressing Steriliser and Boil-up type Utensil Steriliser—Steam Operation.

G. & N. Low-Pressure Vertical Sterilisers, which have been in use for many years in smaller private hospitals, are less expensive than the autoclave type, both in first cost and cost of operation.

G. & N. UTENSIL AND INSTRUMENT STERILISERS for steam, gas or electricity. Gardner & Naylor sterilisers are designed to sterilise by boiling, which is the general practice. They can also be arranged to operate by free steam.

The construction of the steriliser is heavy-gauge, hard-rolled copper, the interior being thoroughly tinned and the exterior nickel-plated finish. The N.P. domed lid is of the "water seal" pattern, and is operated by a balanced treadle action which, for the larger utensil sterilisers, has a dash-pot cushioning arrangement. The treadle operation can also be arranged to raise the perforated lifting tray which is supplied with each steriliser. Hydraulic operation can be substituted for treadle action if required, or less expensive hand-operated balanced lids can be supplied.

These sterilisers, which may be supplied with white enamelled N.P. pipe standards, or cantilevers, are manufactured in the following standard sizes (although other sizes can be supplied):—

UTENSIL STERILISERS—36in. x 36in. x 30in. deep; 36in. x 24in. x 24in. deep; 30in. x 20in. x 18in. deep; 24in. x 18in. x 18in. deep.

INSTRUMENT STERILISERS—22in. x 15in. x 12in. deep; 18in. x 12in. x 9in. deep; 18in. x 8in. x 7in. deep.

FOMENT STERILISER—12in. x 6in. x 6in. deep.

Connections to sterilisers required are: water supply, waste, vent (optional) and either steam, gas or electricity. In the multiple panel arrangement, a high-pressure, steam unit is provided for utensils and instruments.

#### G. & N. WATER STERILISING EQUIPMENT

Gardner & Naylor water sterilising equipment, which is designed to remove bacteria from the water supply, consists of the following:—Two planished copper containers for storing hot and cold sterile water. The interiors are thoroughly tinned and gauge glasses are provided for indicating the water level. A high-pressure water filter clears the water supply before entering the system.

Heating can be by steam, gas or electric operation, or a combination for special requirements. Other equipment includes pressure trap, indicator whistle, air relief valve, necessary connections and control valves. In smaller systems with storage of 15 or 20 gallons of hot and cold sterile water, the complete equipment can be fitted in a panel on the wall, with all pipes and mountings N.P. finish. This takes up a space six feet wide.

Distilled Sterile Water Equipment is sometimes preferred to the plain sterile water system, especially in cases where the water is to be used for chemical solutions.

G. & N. equipment is designed to suit the special requirements of the layout.

#### WARD PANTRY FITTINGS

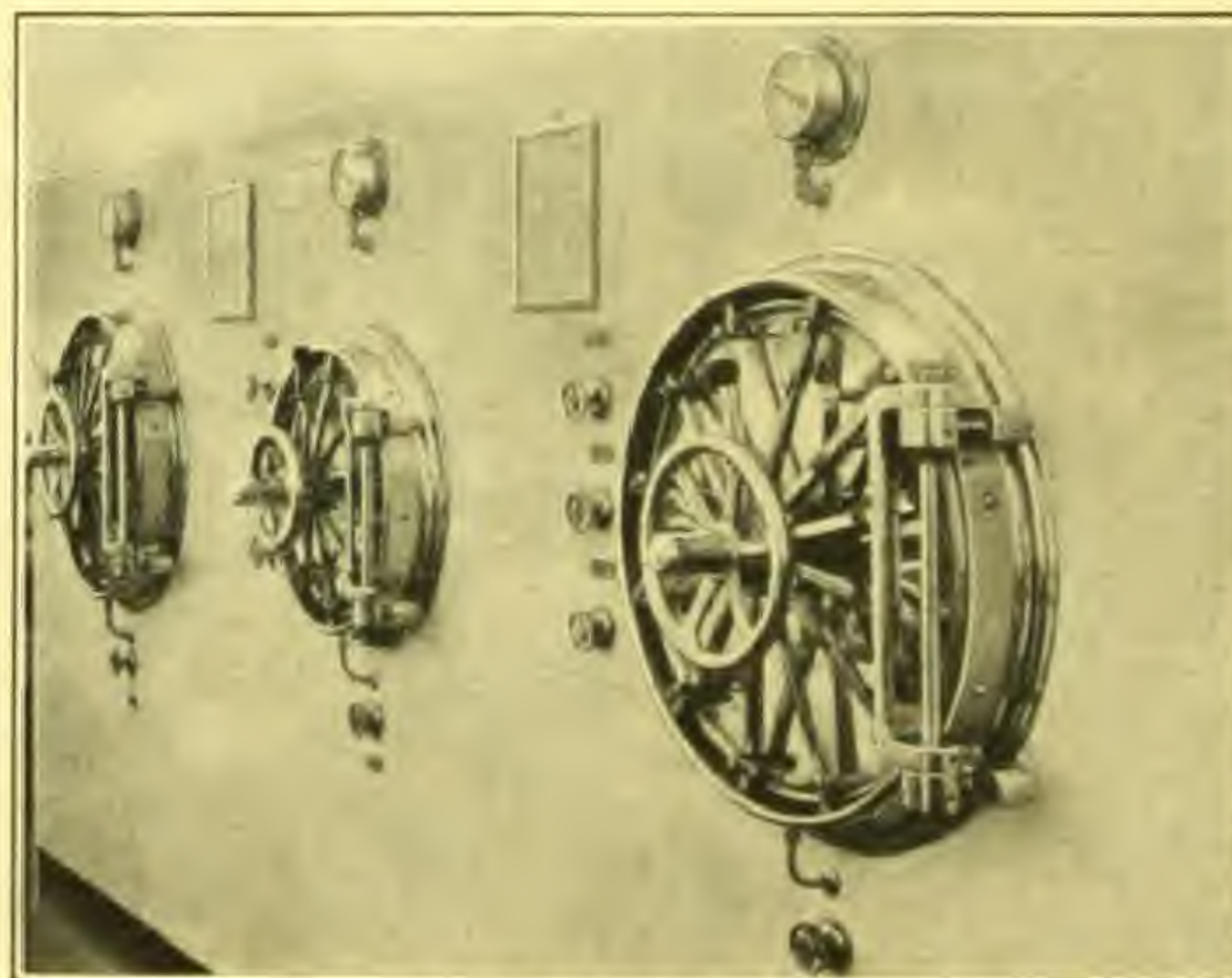
Ward pantry hot press for keeping food from the kitchen warm until delivered to ward patients.

This fitting is finished in white enamel with N.P. mountings and is provided with two shelves and sliding doors and a removable jet pot vessel, with Monel metal interior, and a water boiler, both fitted on the Monel metal top. Dimensions—3ft. 6in. x 1ft. 9in.

#### LAUNDRY FITTINGS

Washing Machines, Gas and Steam-Heated Ironers, Hydro Extractors, Soap Boilers, Drying Rooms, are provided of sizes to suit the requirements of the Hospital.

Gardner & Naylor have carried out many hospital and other laundry installations throughout Victoria.



Three Panel Type G. & N. High-Pressure Dressing and Utensil Sterilisers, showing Indicator Gauges and Control Valve Panels.



GOODRID

## GOODRID INCINERATOR CO.

50 MOUNTAIN STREET, SYDNEY

Phone M 6181

Patent Nos. 18480, 15033, 28365, 21084

35j

S.A.A. File No.

## Products

**Chute or Chimney-fed Incinerators**, for the destruction of garbage and waste materials from Flats, Hotels, Hospitals, Schools, Public Institutions and Private Residences.

**Direct-fed Incinerators**, for Factories, Warehouses, Stores, Public Buildings, Hospitals, Hotels, Theatres, and Private Homes.

**Wood-shaving Incinerators.**

**Municipal Garbage Destructors.**

## General Description

The Goodrid Incinerator consists of a brick combustion chamber with firebrick lining. It can be located either inside or outside any building. The chimney-fed type is located at the base of the chimney. Refuse is fed into it through a hopper receiving door opening into the flue from the kitchen, hall, or other convenient points on the floors above (any number of hopper doors may be used to feed the Incinerator).

**Patent Down Draught Cone.**—All Goodrid Incinerators employ the Goodrid Down Draught Cone, or Cones, for air admission because of the following distinct advantages:—

1. Greatly increased burning capacity per unit of Incinerator volume, thus reducing the first cost of the installation.

2. High efficiency and temperature because the cone when fire is lighted in combustion chamber directs a current of air at great force directly into and over top of garbage and waste material. This ensures rapid and complete combustion by top burning—admitted to be the latest and most scientific method of garbage destruction.

3. Impossibility of smothering the fire because the fire is forced always from the top downwards.

4. The cone system of top draught air admission eliminates all odours and largely reduces smoke troubles.

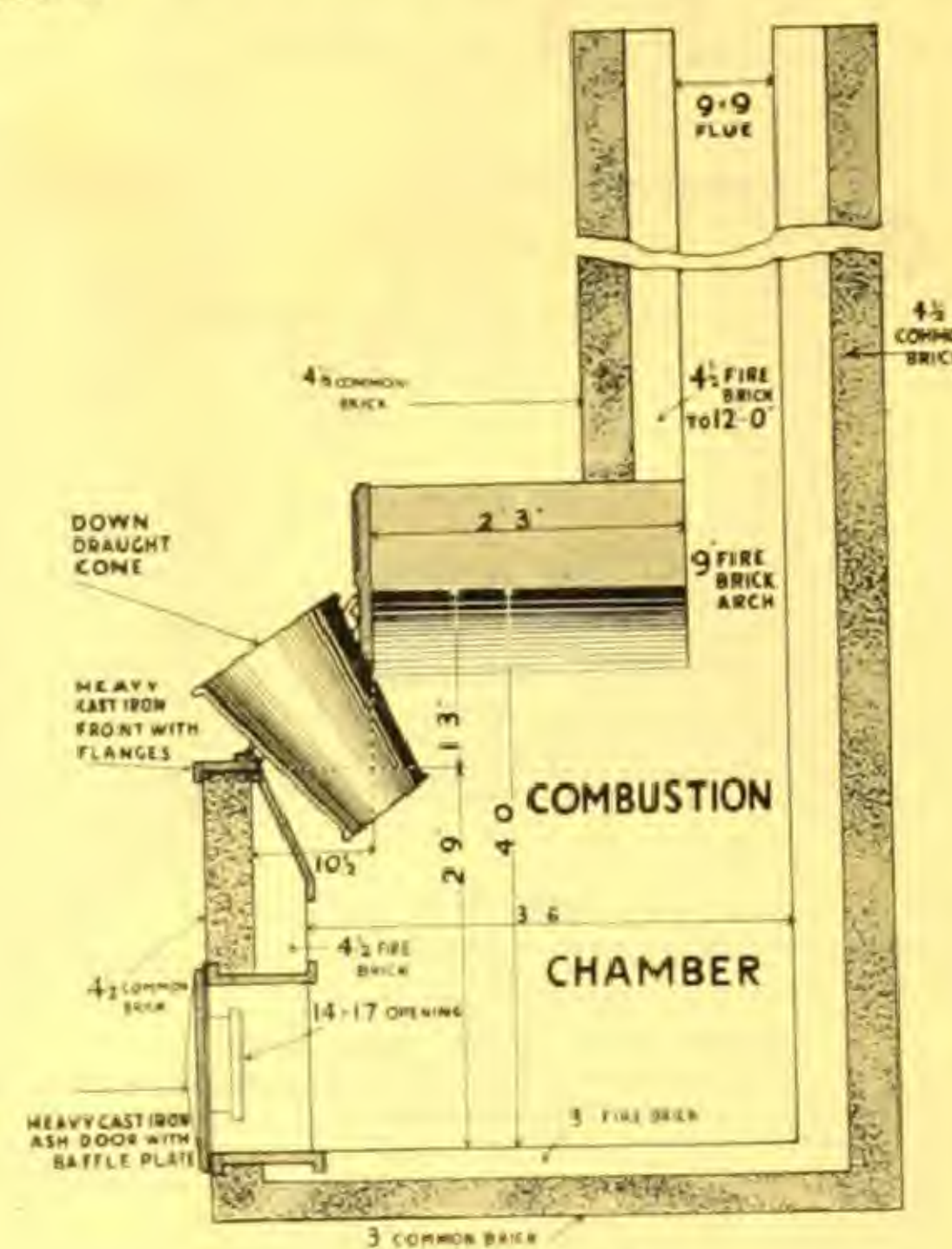
## Goodrid Commercial Type Incinerators

Goodrid Incinerators eliminate fire risks, are approved by the Fire Underwriters, reduce costs of waste and garbage disposal, keep the premises free from rats, etc., and conserve space by avoiding garbage storage.

Goodrid Commercial Incinerators are built in standard sizes with standard commercial common and firebricks. This feature of design and construction reduces maintenance to a minimum.

Provision for expansion and contraction is made in each of the parts.

The firebrick top arch in the larger models is held securely in position by heavy angle irons let flush into side walls of combustion chamber at foot of arch, and side walls are buck stayed with channels and tie rods. Standard sizes are given in Table 1.



MODEL 15/9

TABLE 1  
STANDARD SIZES FOR "GOODRID" TYPE COMMERCIAL INCINERATORS

Model	Capacity cu. ft. per hr.	Overall Sizes			Fire Chamber		Inside Dimensions Flue
		Length	Width over Buckstays	Height	Width	Length	
14/9	35	4ft. 7 1/2 in.	3ft. 9 in.*	5ft. 3 in.	2ft. 3 in.	3ft. 1 1/2 in.	9 in. x 9 in.
15/9	50	5ft. 0 in.	4ft. 10 in.	5ft. 3 in.	3ft. 0 in.	3ft. 6 in.	9 in. x 9 in.
16/9	72	5ft. 8 in.	4ft. 10 in.	5ft. 3 in.	3ft. 0 in.	4ft. 2 in.	9 in. x 9 in.
12/14	90	8ft. 4 in.	5ft. 8 in.	5ft. 6 in.	3ft. 0 in.	6ft. 0 in.	14 in. x 14 in.
13/14	135	9ft. 1 in.	6ft. 10 in.	6ft. 0 in.	4ft. 0 in.	6ft. 9 in.	14 in. x 14 in.

\*Buckstays are not supplied for 14/9 Type.

Note.—If required, Patent Bell Flue can be installed with above Models.

(Continued on next page)



### Goodrid Chimney-Fed Incinerators

Goodrid Chimney-Fed Incinerators are made in three sizes, as listed in Table 2. Reference to the illustration of Model C.C.2 will show the general construction of the Goodrid Chimney-Fed Incinerator. The combustion chamber is built directly under the chimney flue, and garbage, when fed through hopper doors above, falls directly into same. When firing incinerator, the main chimney is closed by means of heavy C.I. damper and gases rising from fire are diverted through the Goodrid Patent Bell Flue, built over top of incinerator (see illustrations) and, after rising and falling, pass into main stack at a point about three feet above combustion chamber. By this means, the necessary high temperature required to completely destroy garbage is retained in combustion chamber and soot nuisance is eliminated.

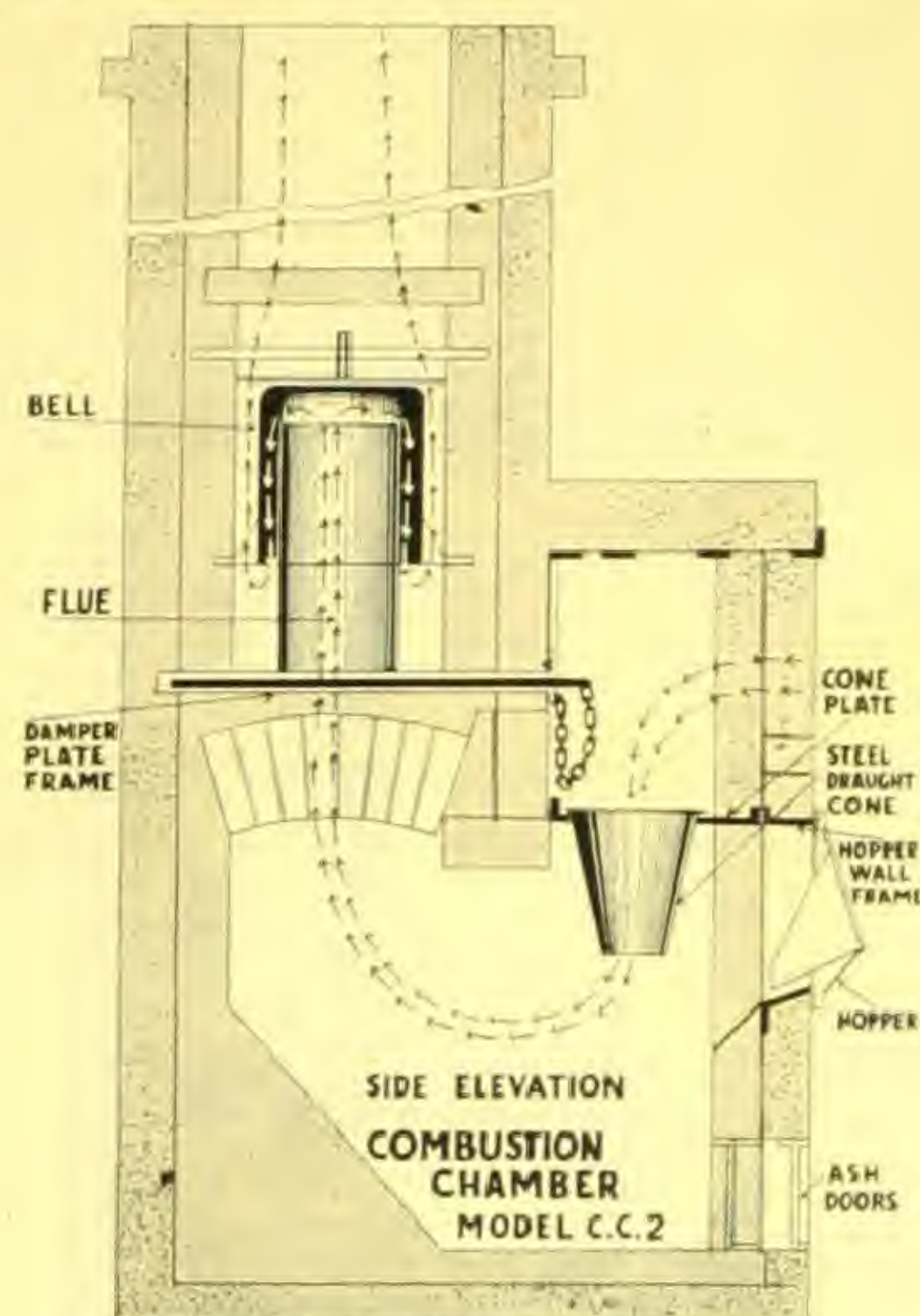


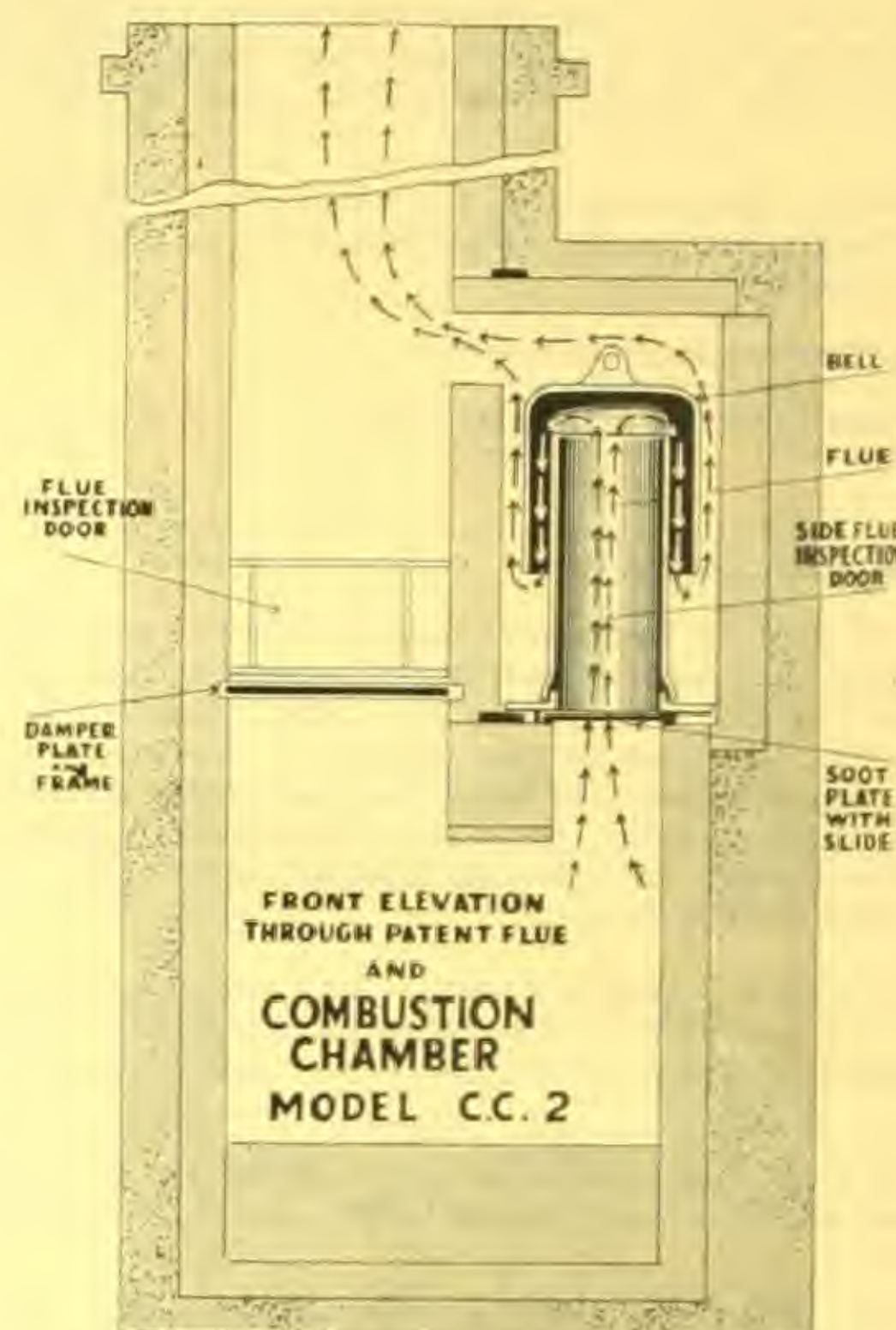
TABLE 2  
STANDARD SIZES FOR "GOODRID" INCINERATORS  
FOR FLATS  
Patent Nos. 18480, 15033, 28365

Model	No. of rooms up to	Overall Sizes			Inside Dimensions Flue
		Length	Width	Height	
C.C.1	10	4ft. 7in.	3ft. 10in.	6ft. 6in.	14in. x 14in.
C.C.2	50	5ft. 0 $\frac{1}{2}$ in.	5ft. 0 $\frac{1}{2}$ in.	7ft. 8 $\frac{1}{2}$ in.	18in. x 18in.
C.C.3	80	5ft. 10in.	5ft. 0 $\frac{1}{2}$ in.	8ft. 0in.	18in. x 18in.

Note.—Patent Bell Flue included in these Models.

### Guaranteed Satisfaction

That Goodrid Incinerators provide economical, efficient disposal of garbage and refuse is best attested by our many installations operating under widely varying conditions. The approval of leading architects and engineers, and the recommendations of our users, warrant our assertion that there is not a garbage and refuse disposal problem which cannot be solved by some type of Goodrid Incinerator. General satisfaction assures that the service we are rendering to others is our best recommendation to you.



### Installation

Goodrid Incinerators can be installed either by the building contractor or by the Goodrid trained Incinerator staff. In those cases where the building contractor installs we supply all necessary Iron and Steel parts, together with plans and specification.

### Goodrid Utility Type Incinerators

Utility types have been largely installed in Schools, Hospitals, Hotels, Theatres, Private Residences, or any place where waste is not too bulky. Installation can be made in any convenient position at a low cost. For dimensions and capacities see Table 3.

TABLE 3  
STANDARD SIZES FOR "GOODRID" TYPE INCINERATORS

Model	Capacity cu. ft. per hr.	Overall Sizes			Fire Chamber		Inside Dimensions Flue
		Length	Width over Buckstays	Height	Width	Length	
Utility 1	30	4ft. 3in.	3ft. 9 $\frac{1}{2}$ in.	5ft. 3 $\frac{1}{2}$ in.	2ft. 8 $\frac{1}{2}$ in.	2ft. 3 $\frac{1}{2}$ in.	9in. x 9in.
Utility 2	40	5ft. 0in.	3ft. 9 $\frac{1}{2}$ in.	5ft. 3 $\frac{1}{2}$ in.	3ft. 5 $\frac{1}{2}$ in.	2ft. 3 $\frac{1}{2}$ in.	9in. x 9in.
Utility 3	50	5ft. 0in.	4ft. 6in.	5ft. 3 $\frac{1}{2}$ in.	3ft. 5 $\frac{1}{2}$ in.	3ft. 0in.	9in. x 9in.

Note.—If required, Patent Bell Flue can be installed with above Models.



<b>G A S</b>  <b>Incineration</b>	<p align="center"><b>THE AUSTRALIAN GAS LIGHT CO.</b></p> <p align="center">PITT, BARLOW AND PARKER STREETS, NEWMARKET, SYDNEY.</p> <p align="center">Phones: M 6503 (24 lines)</p> <hr/> <p align="center">GAS — GAS APPLIANCES — REFINED TARS — DURATAR ASPHALT — PITCH — CARBOLIC OILS — FUEL OILS — BENGALI — MOTOR SPIRIT — SOLVENT NAPHTHA — SULPHATE OF AMMONIA</p>	<hr/> <p align="center"><b>35j</b></p> <hr/> <p align="center">S.A.A. File No.</p>

[For Other Products, See Page 312]

## INCINERATION BY GAS

*(Section 6, continued from page 319)*

Health requirements, coupled with the growing needs of modern building schemes, render it desirable, if not necessary, that refuse from dwellings—and more especially kitchen refuse—be disposed of frequently by hygienic means. In other parts of

the world domestic incineration has become firmly established and it is making rapid yearly progress. Here in Australia it is not as yet very widely used, but the idea is rapidly gaining favour.

### Incineration by Gas is Highly Efficient

Incineration by gas is now recognised as one of the finest methods available. It is extremely simple, perfectly clean, eliminates all odours from burning refuse and disposes of a wide variety of undesirable matter in a thoroughly hygienic manner. The gas incinerator provides a small, compact, out-of-the-way container for all waste accumulations, destroying them at convenience of the user before they have time to decompose and thus create foul odours and germ-breeding grounds.

### Many Types—Different Sizes

Having proved its efficiency for domestic incineration, gas was quickly applied to more difficult types of waste disposal with a corresponding degree of success. The result has been that gas incinerators are now made in types and sizes to suit almost every class of building. These include small portable types for hospitals, clinics, apartment buildings, etc. All of these are not yet available in Australia, but with the further development of hygienic garbage disposal the importation, or manufacture locally, of suitable equipment is almost assured. The gas-heated types already available serve many needs and are indicative of the vast potentialities of this highly efficient system.



A Modern Gas Incinerator.

intense heat destroys every particle of medical and surgical waste and germ-laden refuse, reducing it to a fine ash and at the same time sterilising itself.

As the immediate disposal of medical and surgical waste is one of the greatest factors in preventing disease and in conserving health, the gas incinerator is worthy of a place in almost every hospital.

### What Gas Incineration Means

The gas incinerator does away with the storage of garbage, refuse, etc., and renders the use of a garbage tin or similar receptacle unnecessary. It destroys wet or dry vegetable garbage and refuse, waste paper, dirt sweepings, and collections of all descriptions quickly and silently without creating any odour.

### Easy to Install

A gas incinerator can be readily installed in the kitchen or laundry as it takes up very little space and the gas connection involves very little work. This has particular application to the portable type, but in the case of the wall type the installation work is also simple and straightforward when suitable provision has been made to accommodate the incinerator.

### Ideal for Hospitals and Public Institutions

Modern gas incinerators provide an excellent system for the removal and disposal of waste from operating theatres, wards and kitchens. The



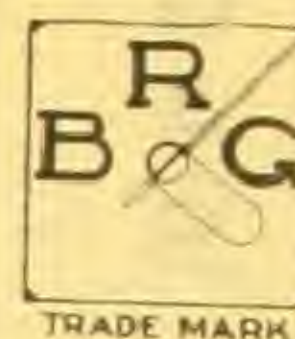
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S.A.A. File No.

# THE AUSTRALIAN REINFORCED CONCRETE ENGINEERING COMPANY PTY. LTD.

Head Office: NORMANBY CHAMBERS, CHANCERY LANE, MELBOURNE  
Works: SUNSHINE, VICTORIA, AND STRATHFIELD, N.S.W.

Agencies: SYDNEY, BRISBANE, ADELAIDE, PERTH, HOBART,  
NEW ZEALAND



[For Other Products, See Page 24]

## B.R.G. ROLSCREENS

Having recently acquired from the Rolscreen Co., of Pella, Iowa, U.S.A., the numerous Patent Rights of their famous Rolscreen Blind for the Commonwealth of Australia, New Zealand, Java, Straits Settlements and the Islands, we are commencing the manufacture of "B.R.G." Rolcreens at our works at Sunshine, Victoria. As in the

past, it is our intention to manufacture a product of marked excellence; to present it truthfully—to follow each installation with sincere interest and to conduct our business relationship in a prompt and efficient manner. We solicit the continued patronage of our numerous clients for this, our next product of manufacture.

### B.R.G. Rolscreen Facilities

The first considerations in the designing of B.R.G. Rolcreens have always been that they must be of rigid and durable construction; they must be simple to install and easy to operate. Mammoth presses, intricate rolling machines, and the most modern tool equipment have contributed their part to this, and at the same time they assure accuracy and precision in the manufacturing processes.

### B.R.G. Rolscreen Features are Patented

Those features which have made B.R.G. Rolcreens practical and have led to their adoption and use by thousands of Owners, Builders and Architects, are exclusive and patented.

### B.R.G. Rolscreen Guarantee

B.R.G. Rolcreens are guaranteed against defects in workmanship or material and to operate perfectly for over a two-year period. A new screen will be furnished free of charge for any failing under this guarantee. This does not cover damage or abuse to the screen or any other condition beyond the control of the manufacturer.

### B.R.G. Rolscreen Advantages

**Installed on the Inside.**—Inside screening has many advantages. The screen stays clean and lasts indefinitely. No rain beating through dirty screens on to the window panes. B.R.G. Rolcreens installed on the inside protect the draperies the year round from sooty and grimy sills.

**Convenient.**—They are easily and conveniently accessible. At a touch of the fingers they are raised for washing windows, adjusting awnings or watering flowers, or stored for a season or a year.

**Inconspicuous.**—They are practically concealed. The special non-rust "Alumina" cloth allows a clear vision. Rather than detract from the beauty of the windows, B.R.G. Rolcreens have been designed to be just as inconspicuous as possible. They can be decorated to harmonise with the window trim.

**Economical.**—The cost of B.R.G. Rolcreens compares favourably with that of good quality wood screens which require special hardware. There is no cost of storing, painting or repairing.

**Permanent.**—They are practically indestructible and may be considered a permanent part of the window. They are always ready for their screening duties.

### Materials

**Metal.**—B.R.G. Rolcreens are constructed of lead-coated terne plate metal, which forms a perfect bond for paint.

**Wire Cloth.**—The screen cloth is 16-mesh rust-proofed triple-selvedged "Alumina" especially woven and processed for B.R.G. Rolcreens. It is of a clean grey colour and almost invisible. It has great tensile strength, it is rigid, and it is built up of materials that will not break or crack under continuous flexing. The mesh is perfect, sixteen strands to the inch—the ideal weave. It keeps out the smallest insects, yet allows maximum visibility and ventilation.

**Springs.**—Made of a high-grade oil-tempered steel wire, coiled in our own plant by the most modern automatic machinery, thereby insuring uniform quality.

**Bearings.**—Solid steel.

**Mandrel.**— $\frac{3}{4}$  in. steel rod.

### Housing

B.R.G. Rolscreen housing is electrically welded and of very sturdy construction. Recessed ends reinforce it and make it rigid. The standard housing is  $2\frac{1}{2}$  in. square. For openings less than 52 in. high a  $2\frac{1}{4}$  in. housing may be used, and for openings less than 36 in. high a 2 in. housing may be used. For openings over 84 in. high a  $2\frac{3}{4}$  in. housing must be used.

### Floating Roller Assembly

A special feature of B.R.G. Rolcreens is the patented "floating" roller. As the screen lowers and the roll of screen cloth grows smaller, the entire roller assembly automatically moves forward. The screen wire cannot drag on the lower edge of the housing and cannot wear out. The entire roller, including the spring, is built in the B.R.G. Rolscreen factory. The springs are coiled out of extra heavy oil-tempered wire on automatic machines operated under most careful supervision. After rigid inspection the springs are all thoroughly tested and mounted in the heavy metal roller.

### Guides

The B.R.G. Rolscreen guides grip lugs fastened in the selvages of the screen wire and prevent its sagging and bagging. Slotted holes in the attaching flanges allow for adjustment in case of swelling or shrinking of woodwork. Blocks on the ends of the cross-bar are frictionally engaged in the guides. This construction prevents the cross-bar tilting out of the guides and regulates the action of the screen. When the screen is released from the sill it does not fly to the top. The friction in the guides stops it about half way up, where a touch of the fingers can raise or lower it. When installing B.R.G. Rolcreens the cross-bar, as it is drawn down through the guides, acts as a template and automatically adjusts the guides in the opening. Lips at the upper ends of the guides, co-acting with the housing, assure proper, accurate installation.

(Continued on next page)



**Fasteners**

When lowered, B.R.G. RolSCREENS are automatically locked on the window boards by spring catches, which are unlocked only from the inside. When released, the screen automatically rises about half its length to a point which makes the window easily accessible. A patented vernier arrangement of the catch provides perfect adjustment to the sill.

**Friction Angles**

When screens are to be built into old work or are to be used with metal double hung windows, they can be mounted by means of the friction angles. These angles are attached to each jamb and support the screen box and frictionally hold the screen guides.

**Plaster Channels**

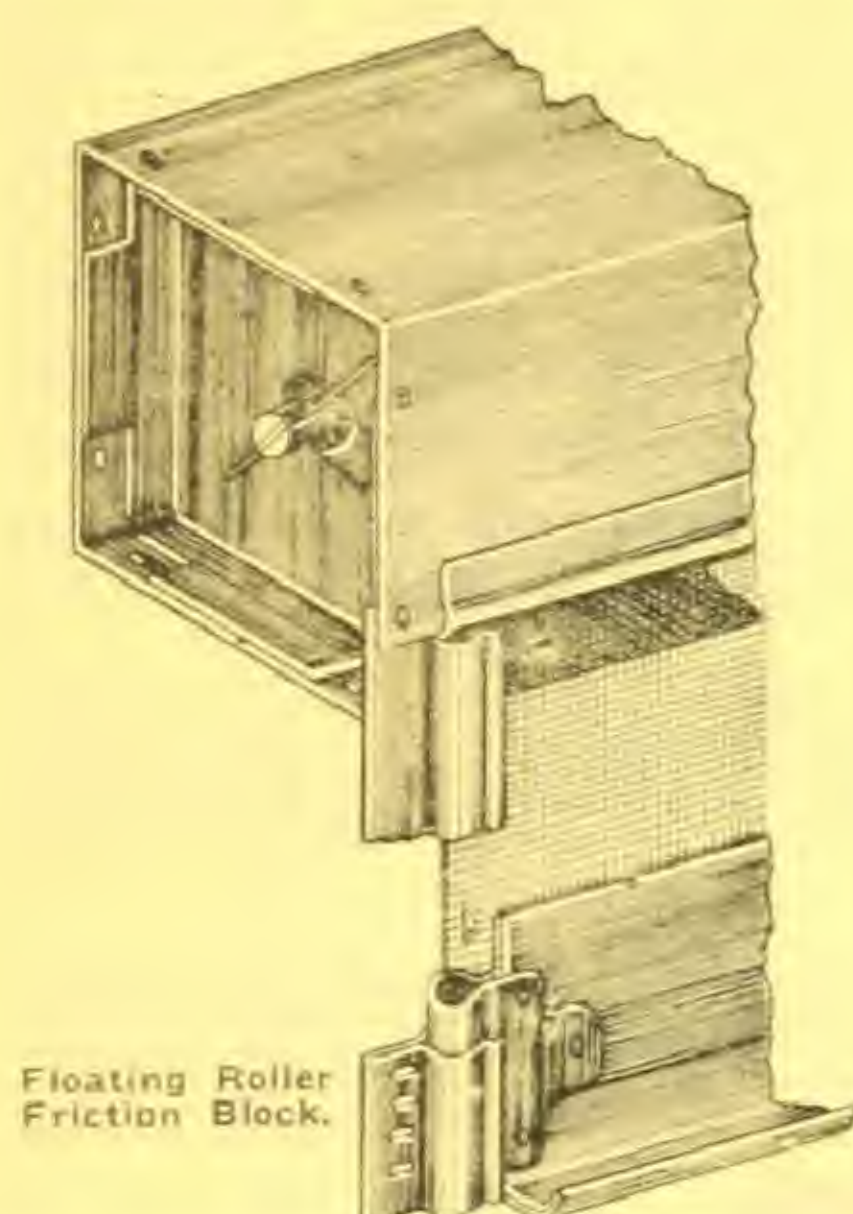
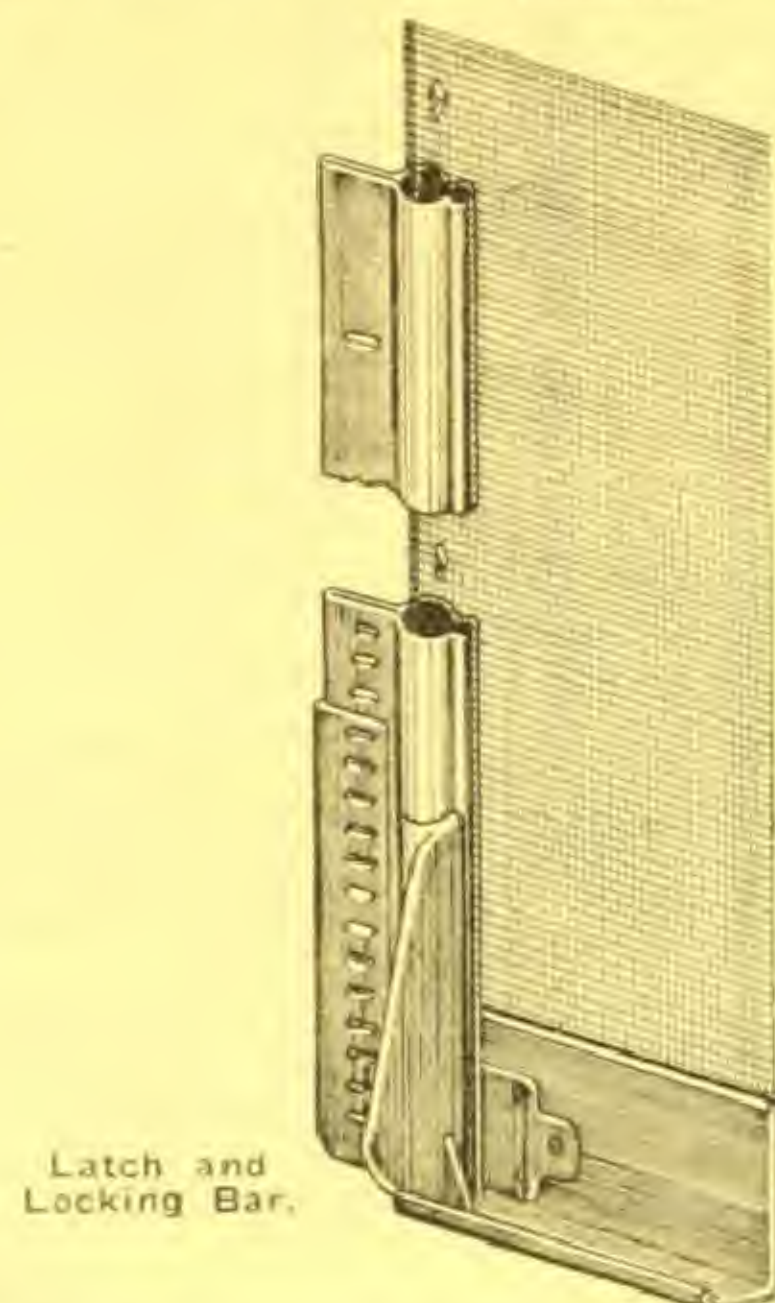
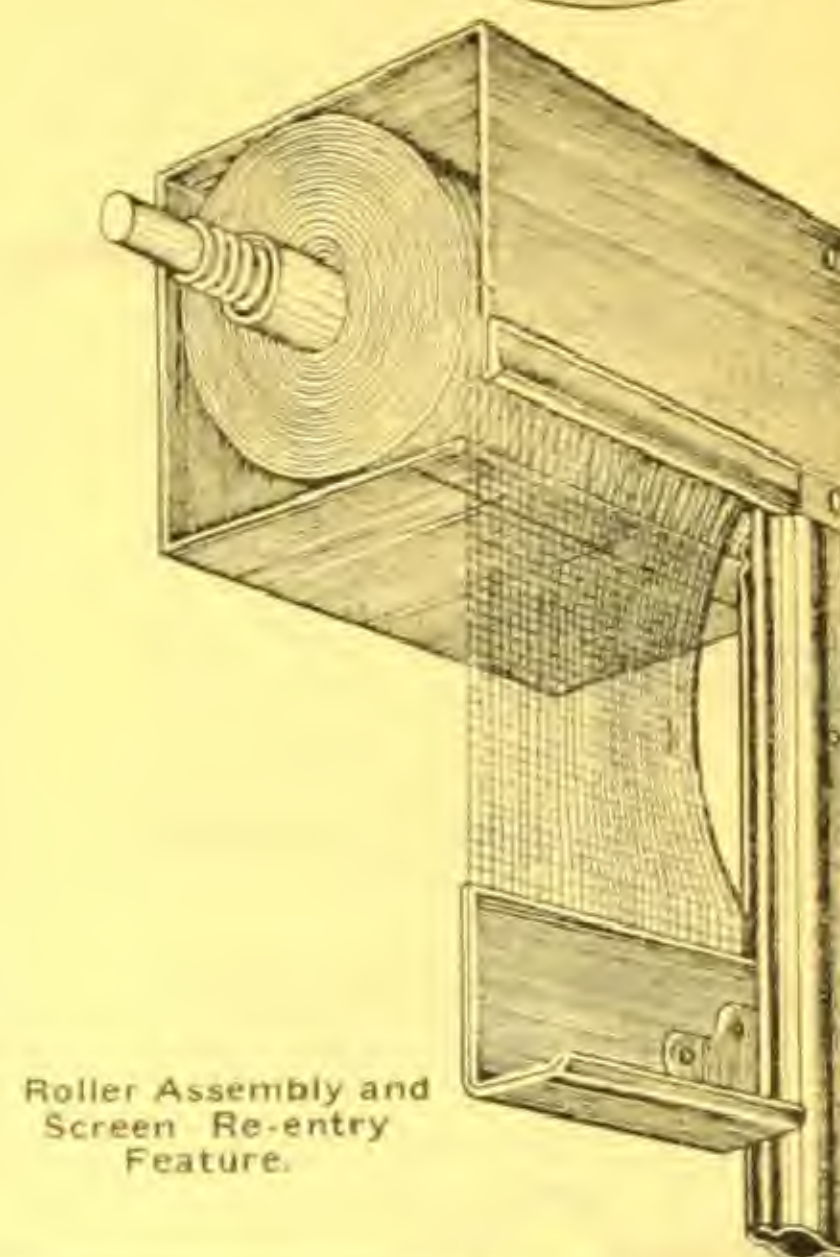
Special channels, which are embedded in the plaster, may be used. B.R.G. RolSCREENS are installed quickly without using any wood trim or screws to hold them in place. This installation is simple and very economical.

**Metal Mullions**

Where openings are over 61 in. wide, mullions must be used. These can be of simple wood construction, or metal mullions can be furnished, as shown on the following page.

**B.R.G. RolSCREENS are Indestructible**

B.R.G. RolSCREENS are built to stand up under hard service. If the screen wire accidentally receives a blow hard enough to tear or bag the ordinary screen, the lugs in the selvages of the screen are released at the sides without injuring the wire. Upon pushing all of the released lugs to the outside, raising the screen and again lowering it, the lugs automatically re-enter the guides, and the screen is stretched in its normal position.

Floating Roller  
Friction Block.Latch and  
Locking Bar.Roller Assembly and  
Screen Re-entry  
Feature.**B.R.G. ROLSCREEN SPECIFICATIONS****A.—SCREENS.**

Screens shall be B.R.G. RolSCREENS as manufactured by the Australian Reinforced Concrete Engineering Co., Melbourne, Victoria.

**B.—WORK INCLUDED.**

Note.—List and locate either in schedules on plans or under this heading. If both double hung and casement windows are included, list or schedule each under separate sub-heading.

**C.—MATERIALS AND CONSTRUCTION.**

1. Metal.—Screens shall be constructed of heavy lead-coated terne plate.
2. Wire Cloth.—Screen wire shall be 16 mesh rust-proofed "Alumina" with triple selvage. The screen cloth shall have lugs spaced at regular intervals along the two edges which shall be engaged by the tubular guides.
3. Metal Housing and Roller Assembly.—The screen cloth shall be attached to a steel roller encasing a heavy, thoroughly lubricated, oil-tempered spring. The roller shall be contained in a metal housing 2½ in. square (2½ in. if opening is over 84 in.). Roller mounting shall be of floating type, which allows roller to automatically move forward as size of screen roll reduces, eliminating "drag" of screen wire on lower edge of roller housing.
4. Guides.—The jamb guides shall be so mounted that they are slidably adjustable when the screen is raised or lowered to compensate for any expansion or contraction in the window frame. The guides shall be provided with lips at their upper ends inserted into slots in the roller housing (to assure proper alignment) with the beaded portion cut away adjoining the housing when accidentally knocked out of the guides.

5. Spring Catches.—Spring catches shall be attached to the lower end of the guides, carefully adjusted to automatically lock the cross bar of the screen close to the sill.

**D.—WOOD JAMB STOPS.**

The wood stops, to which the screen guides are fastened and which support the roller housing, shall be furnished and installed with stop screws and washers by others ready for the screen installation.

Note.—Omit if plaster jamb channels or friction angles are included.

**E.—PLASTER JAMB CHANNELS.**

RolSCREEN guides and housing shall be mounted on plaster jambs in plaster channels set in position before plastering. Channels shall be set absolutely plumb and true on each jamb and accurately on some "full inch" dimension back to back.

Note.—Omit if wood jamb stops or friction angles are included.

**F.—FRICTION ANGLES.**

Friction angles shall be mounted on the jambs or window as detailed and shall be set true and plumb. They shall receive and hold in position the RolSCREEN housing and guides.

Note.—Omit if wood jamb stops or plaster channels are included.

**G.—INSTALLATION.**

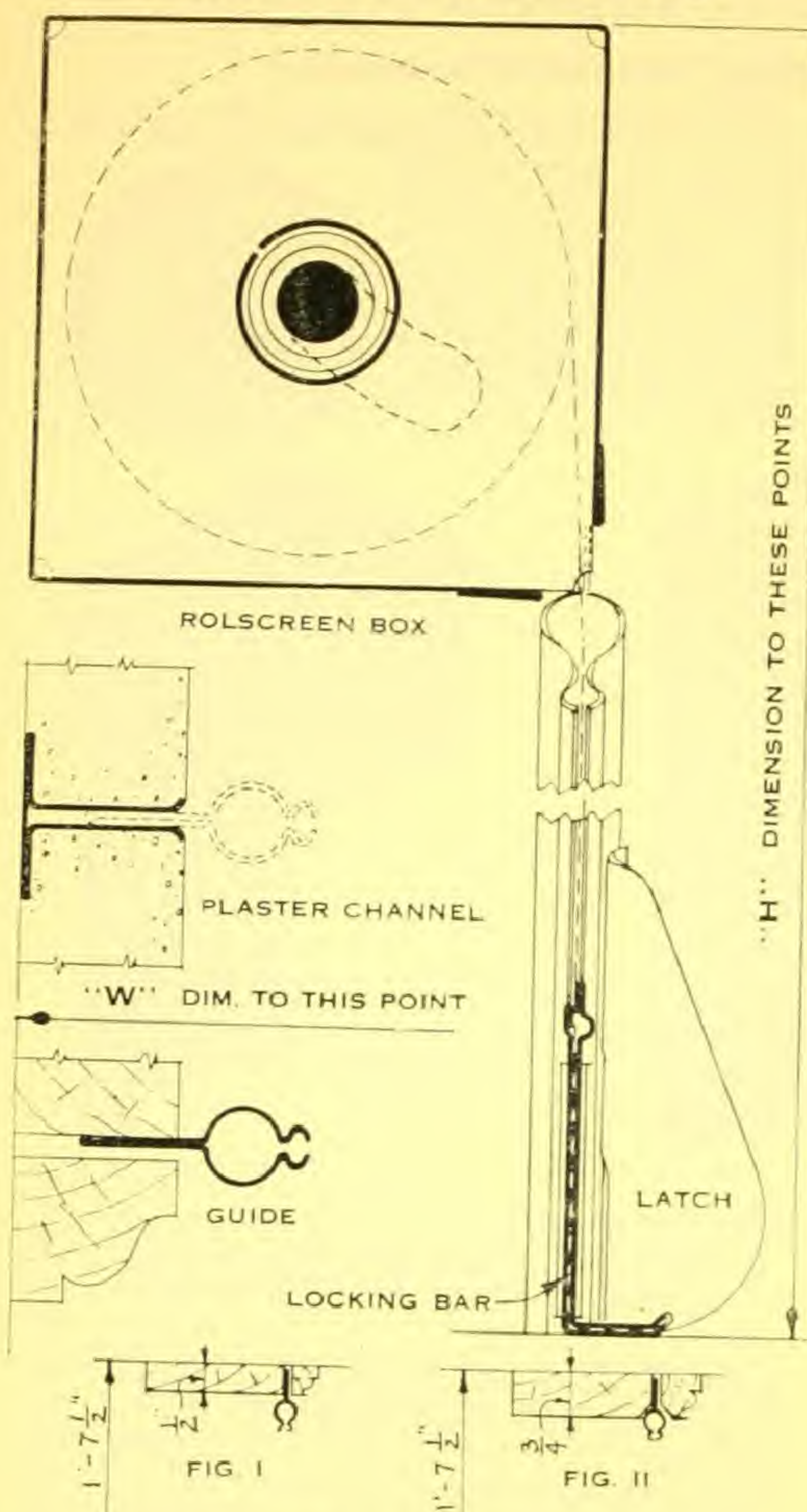
B.R.G. RolSCREENS shall be accurately installed in strict accordance with the manufacturer's erection instructions. Guides shall be so mounted that the beaded portions and outside edges of guides shall not be in contact with window jambs. Entire installation shall be made so screen operates freely and easily.

(Continued on next page)



## DETAILING INFORMATION

## FULL SIZE SECTIONS



"W" and "H" Dimensions.

**IMPORTANT NOTE.**—If the trim is lowered over the front of the box at the head, at least 1 in. of the lower front side of the box must be left exposed to allow the wire to re-enter when knocked out of guides.

## Details

The details shown on the opposite page are only suggestions to be used by the architect as a guide for devising his own details. They are intended to convey the basic idea of B.R.G. Roloscreen installation and the manner in which B.R.G. Roloscreen sizes are determined.

**"W" Dimensions.**—B.R.G. Roloscreens are made in each "full-inch" width from 11 in. to 5 ft. 1 in., inclusive. Openings wider than 5 ft. 1 in. can be screened by building in simple mullions.

## THICKNESS OF STOPS.

Rule I.—If opening measures on the "full inch," i.e., 11 in., 12 in., etc., select Roloscreen with "W" dimensions equal to width of opening, using stops  $\frac{3}{4}$  in. thick.

Rule II.—If opening measures on the "quarter-inch," i.e., 11 $\frac{1}{4}$  in., 12 $\frac{1}{4}$  in., etc., drop the fractional measurement, using Roloscreens 11 in., 12 in., etc., respectively, and install with stops  $\frac{3}{4}$  in. thick.

Rule III.—If opening measures on the "half-inch," i.e., 11 $\frac{1}{2}$  in., 12 $\frac{1}{2}$  in., etc., select Roloscreens of the next wider "W" dimension and install, using stops  $\frac{3}{4}$  in. thick.

Rule IV.—If opening measures on the "three-quarter-inch," i.e., 11 $\frac{3}{4}$  in., 12 $\frac{3}{4}$  in., etc., select Roloscreens of the next wider "W" dimension and install, using stops  $\frac{3}{4}$  in. thick.

If stops of uniform thickness are to be used in openings containing fractional inch dimensions, the same result as using thinner stops can be obtained by levelling the corners of stops adjacent to guides. See Figs. 1 and 2.

**"H" Dimensions.**—The "H" Dimensions can be any length up to 96 in., for widths 1 ft. 7 in. or over; any length up to 75 in., for widths between 1 ft. 1 in., and 1 ft. 7 in.; any length up to 50 in., for widths 1 ft. 1 in. or less.

For openings not over 84 in. high—the standard 2 $\frac{1}{2}$  in. housing is recommended.

For openings over 84 in. high—the special 2 $\frac{1}{2}$  in. housing must be used.

For openings not over 52 in. high—the special 2 $\frac{1}{2}$  in. housing may be used.

For openings not over 36 in. high—the special 1 $\frac{1}{2}$  in. housing may be used.

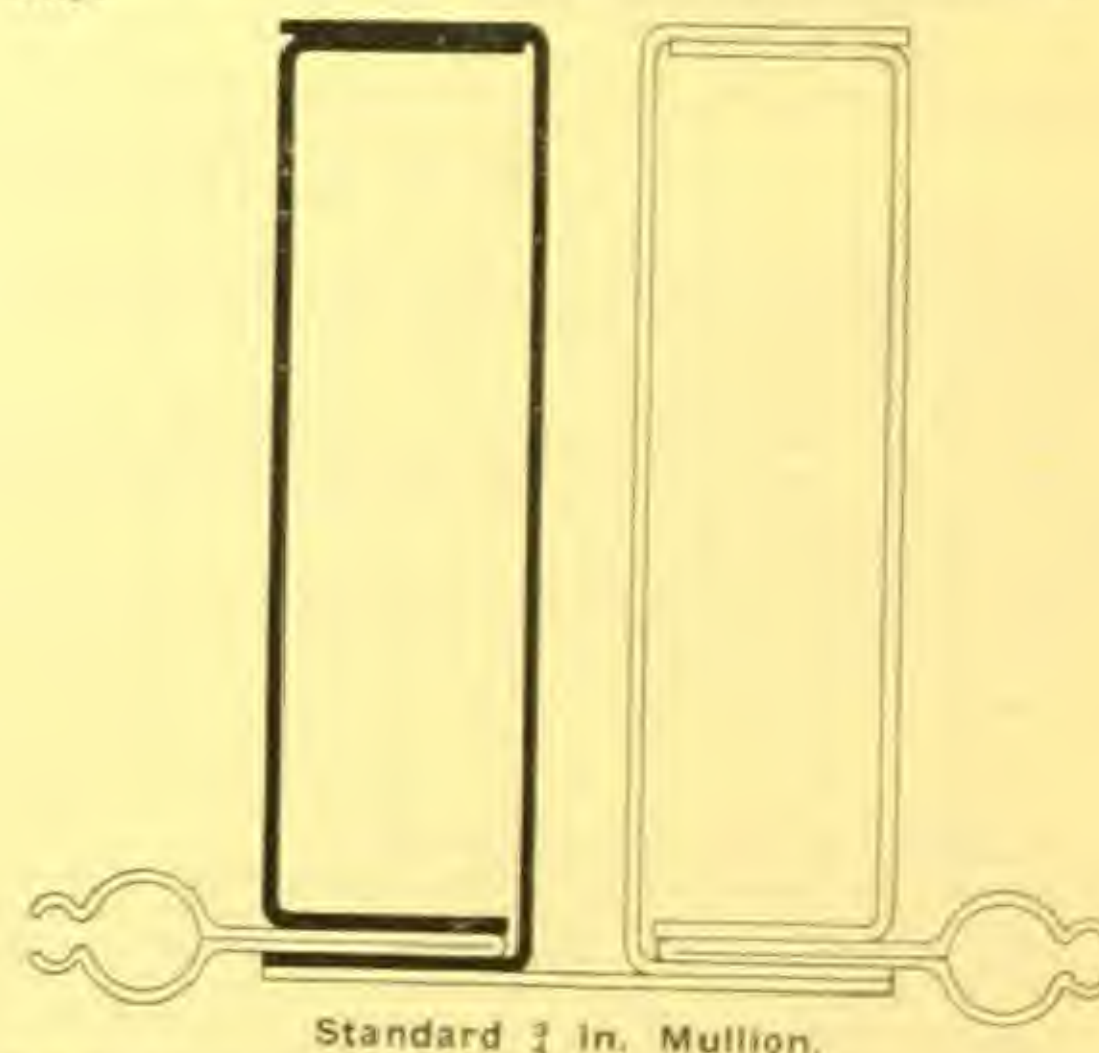
Note.—Due to limitation of spring length, screens from 14 in. wide to 18 in. wide cannot be furnished over 75 in. high. Widths from 11 in. to 13 in. cannot be over 52 in. high.

## PLASTER CHANNELS.

When plaster channels are used, great care should be taken to make certain they are set on an exact "full inch" dimension back to back and plumb. Plaster channels are furnished complete by the Australian Reinforced Engineering Company at a slight additional cost; they are carried in stock in lengths up to 96 in.

## METAL MULLIONS.

Metal mullions can be furnished by the company for all sizes of Roloscreen housings. Double mullions are used when a screen is to be installed on each side, and are built to any specified width to take up fractions in opening dimensions. Single mullions are used when a screen is to be installed on one side only.



Standard 1 in. Mullion.

## FRICTION ANGLES.

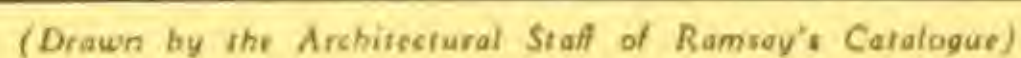
Friction angles are used in new or old construction, and also in metal-jamb windows. They are attached directly to the face of the jambs. They are made in varying depths, so as to adapt Roloscreens of standard size to fractional inch widths. In ordering, give exact opening width, and proper sizes of angles will be furnished.



Standard 1 in. Friction Angle.

(Continued on next page)







<p>35p</p> <p>S.A.A. File No.</p>	<p><b>THOMAS EVANS PTY. LTD.</b></p> <p>415, 417, 419 BOURKE STREET MELBOURNE</p> <p>Telephone C. 6986</p> <p><i>Manufacturers of Thomas Evans' Shade Cloths</i></p>	<p>THE HOUSE FOR CANVAS</p>
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### Products and Service

"Florentine" and Outside Window Shades, Verandah Blinds, Spring Roller Blinds for Doors and Windows, Sky-light Shades, and Woven Canvas Fire Hose and all Canvas Goods. A trained staff of experts are ready to install all blinds at moderate charges.

### Thomas Evans' Shade Cloths and Blinds

#### Material

All material used in Thomas Evans' Blinds are of the very strongest and best that can be obtained, in order to ensure long life and lasting service.

### Colours and Shades

Strong colours are used for both outside and inside shades. Our wide range of colours ensures satisfaction for all purchasers. Samples will be forwarded on application.

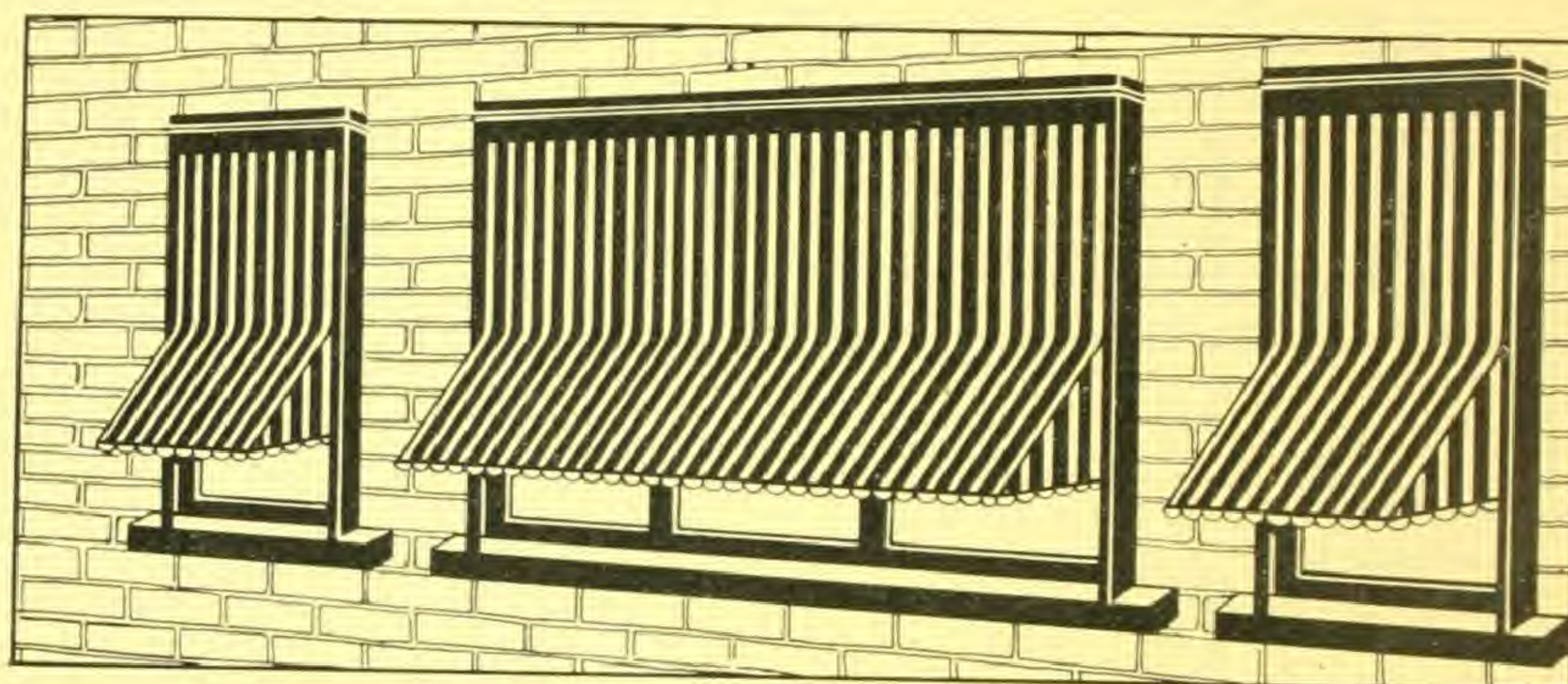
### Sizes Available

Verandah Blinds: Width, 3 ft. to 15 ft.; Depth, 5 ft. to 9 ft.

Spring Roller Blinds: Width, 1 ft. 3 in. to 9 ft.; Depth, 4 ft. to 9 ft.

"Florentine" Blinds: "Width, 2 ft. 6 in. to 8 ft.; Depth, 3 ft. to 7 ft.

Blinds of any measurement can be made to order.



FLORENTINE BLINDS.

The Most Effective Blinds for Shade and Ventilation.

### Exterior Window Shades

Exterior shades are a great asset, especially on any windows facing either the north or the west. In both public buildings and private houses much of the discomfort of the strong summer sun can be avoided by the installation of outside blinds made of the strong, serviceable Thomas Evans' shade cloths, striped and shaded in practically any colour that is required.

### Florentine Blinds

These renowned blinds protect the room from the scorching rays of the sun and at the same time allow a current of cool air to pass into the room. When not in use they roll up neatly and easily. The fittings are shown in detail in the accompanying drawing, and it will be noticed that the box at the top, while acting as complete protection to the blind, can be adapted to any style of architecture.

### Verandah Blinds

Thomas Evans' verandah blinds have become famous for their excellence and completeness. The experience of many years has enabled us to give absolute satisfaction with respect to the texture and colour of the canvas used, and also as regards the fittings. Unless verandah blinds are correctly cut and fitted, they are liable to sag, become noisy, and wear very quickly. Great care should therefore be taken when forwarding measurements. An expert staff is always ready to advise clients and install the blinds if desired.

### Awnings for Shops, Clubs, Hotels, Etc.

Awnings for large terraces at hotels, clubs, etc., are a very important factor in the comfort of guests and members, while a disappearing awning for shop fronts is not only a protection to the goods in the window and intending purchasers, but also considerably enhances the appearance of the shop. Complete specifications will be furnished on application.

(Continued on next page)



### Spring Roller Blinds

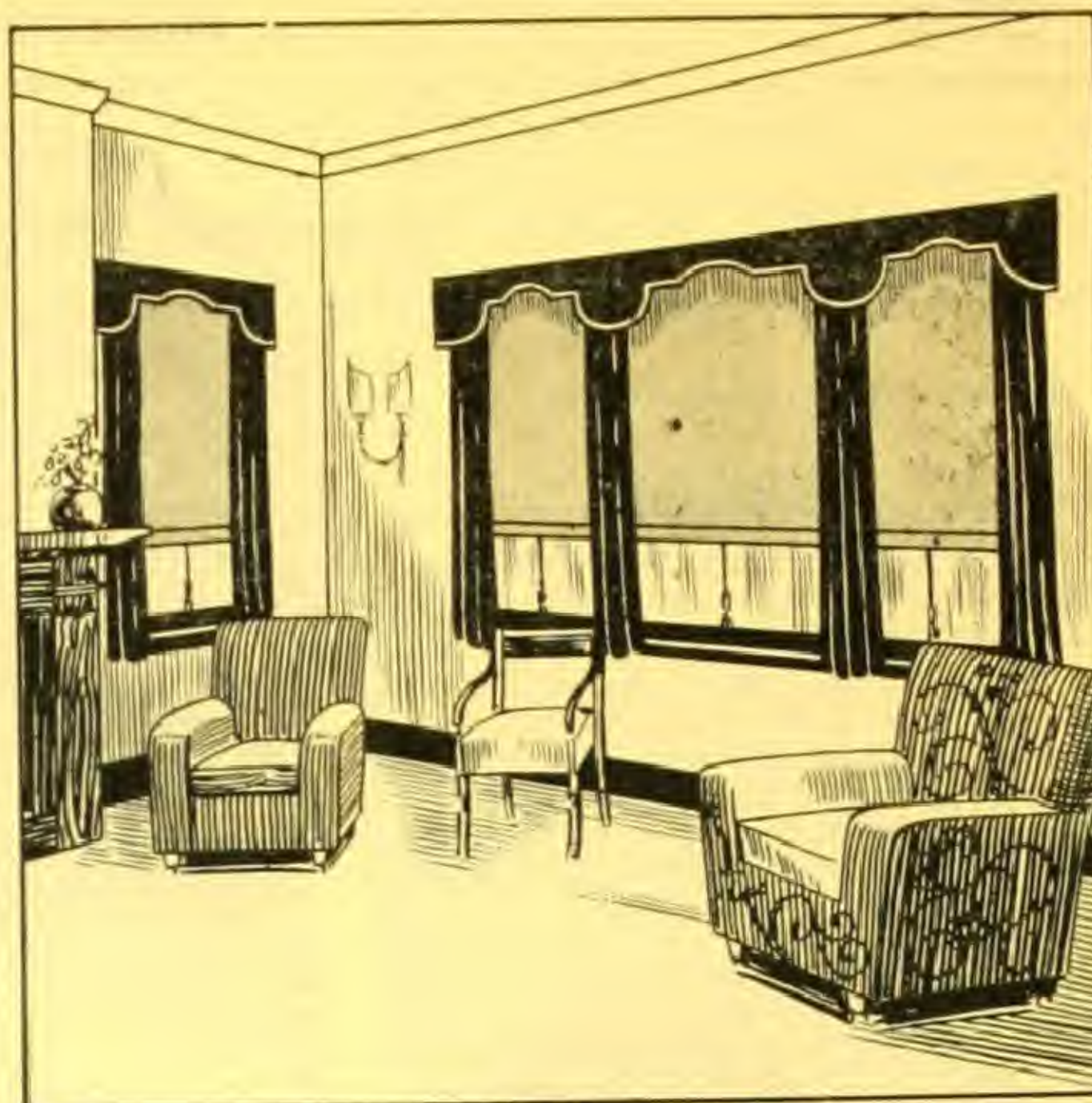
All Thomas Evans' Spring Roller Blinds are made of the best Blind Holland, mounted on Hartshorn's Rollers. Samples will be supplied on application, and blinds can be obtained in the following colours: *cream, green, blue, nigger brown, brown, red or beige*. When ordering, the width of the cloth and pin measurement should be stated.

### Skylight Shades

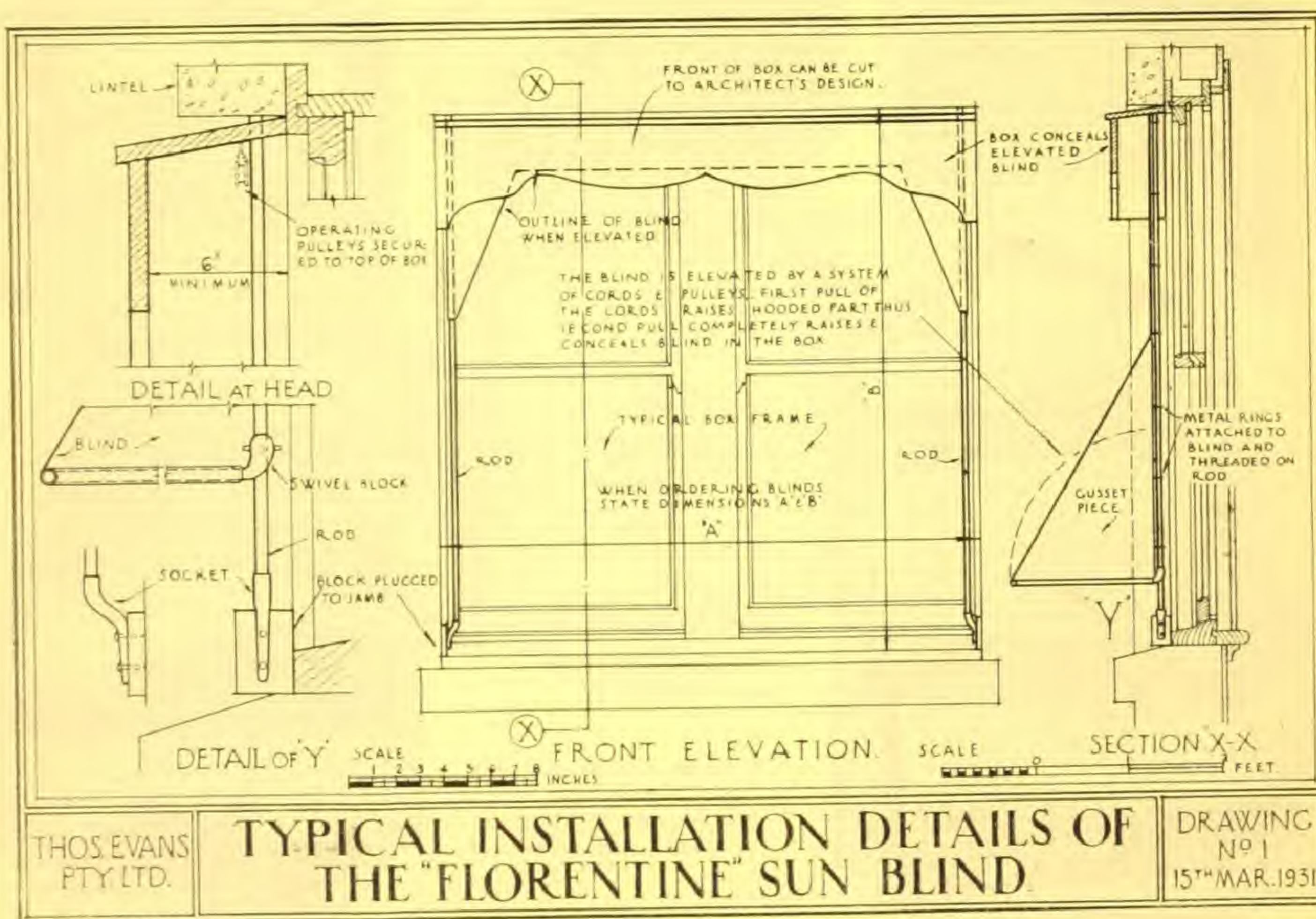
Skylights are of great value for lighting, but very often they offer a large expanse of glass to the sun's rays, which, in summer, creates great heat within the room. An effective shade will give a soft diffusion of light instead of the strong glare.

### Woven Canvas Fire Hose—For Installation in Buildings

We are sole suppliers of the world-famous "Camel" and "Monsoon" Woven Canvas Hose. The "Camel" will withstand a pressure of 650 lbs. per square inch, and the "Monsoon" a pressure of 375 lbs. per square inch. The "Camel" hose, as used by the Melbourne Fire Brigades and the Country Fire Brigades, is made in 2½ in. only. The "Monsoon" Hose is made in all sizes from ¾ in. to 3 in. diameter, and the 2½ in. size is a standard quality for installing in buildings. It will pass the Fire Brigades Tests.



Spring Roller Window Blinds.



(Drawn by the Architectural Staff of Ramsay's Catalogue)



# GRACE BROS. LTD.

BROADWAY, SYDNEY  
NEW SOUTH WALES.

35p

S.A.A. File No.

"SURE TO  
GET IT  
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## VERANDAH AWNINGS AND BLINDS

[For Other Products, See Pages 265, 305, 419]

Modern Architects have set a new Fashion in Sun Blinds and Awnings.

The Mediterranean and the East are now playing an important part in architecture and colour.

In order to meet this new idea, Grace Bros. have had manufactured, to their special designs and colourings, new combinations of multi-coloured Awning Duck to suit the latest ideas in Spanish and Oriental Architecture.

The benefit of our years of experience, and the advice and suggestions of our specially-trained staff, is at your command. We endeavour to give the utmost satisfaction with all our work, and no job is complete until we have given that satisfaction.

Telephone M 6506, and one of our representatives will call. Patterns and quotations forwarded on receipt of measurements.



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WE SEND TO MEASURE IN CITY AND SUBURBS FREE



The illustrations on this page are taken from photographs of AWNINGS and SUN BLINDS made and fitted by Grace Bros. Ltd.

Architects contemplating the fitting of Awnings should call or write for samples of our fine range of colours and qualities.

We do not consider a job complete until YOU are satisfied. We want your business and in return will give you complete satisfaction.

We also specialise in WINDOW BLINDS, and have in stock a range of 33 shades in Best Fadeless Quality Window Holland. Harmony in any furnishing scheme is thus assured.

We invite your inspection of the new HYGIENIC ROLLER FLY-WIRE SCREEN—it is simple, efficient, up-to-date, and, above all, inexpensive.

Try us when you next require Awnings, Window Blinds, etc.



Verandah and  
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WEST BUILDING.



The above illustrations will serve to prove that we can execute any kind of awning work in a satisfactory manner.

We have introduced a new convertible type of Iron Fitting for projecting Verandah Blinds, which will allow a blind to project at any angle when required to be used as a shade from the sun—when it is required for sleep-out purposes or as a protection from rain or wind it can be converted by lowering it to a vertical position, which allows the blind to fit close to the verandah posts, thus giving the protection required.

Architects who may be interested in this or any blind showing in our illustrations, are invited to call at our Blinds Department, where we have one of each type on show for their inspection.

We hope every builder and every architect will provide for a permanent strong fitting to carry the strain of an outside blind. This is often left until the necessity for an outside blind arises.

WE SEND TO MEASURE IN CITY AND SUBURBS FREE



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[For Other Products, See Pages 36, 76, 120, 175, 251]

## AWNINGS AND BLINDS

### Manufacture

All Chandler Blinds are made in our own factory under the supervision of experts. Materials are of the very best quality, and all workmanship is guaranteed.

### Materials

Verandah Blinds are made in the following materials:—English White Duck, Strong English White Duck, Heavy English White Duck, Extra Heavy English White Duck, Strong English Striped Duck, Heavy English Striped Duck, Extra Heavy English Striped Duck, Special Heavy White Duck, Special Striped Duck or Striped Flax, and in the multi-coloured Ducks which are so much in vogue. Samples of these materials are sent on application.

### Equipment

The Blinds are sent out complete with top batten, heavy bottom roller, single and double pulley straps, cord and staples, and a pulley at each end, complete.

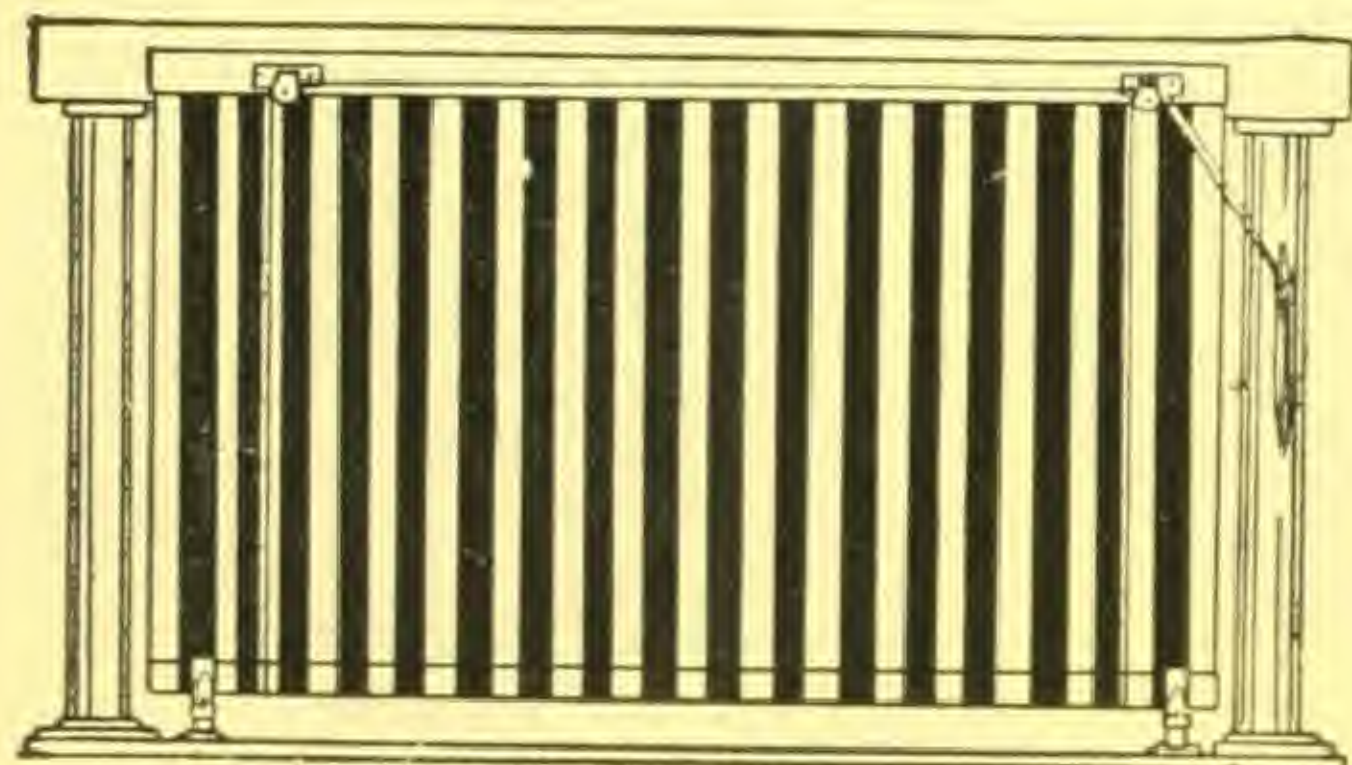
Dome-shaped doorways, 2 ft. wide and 5 ft. 6 in. high, are fitted into blinds when required; the flap rolls up and is tied with tapes.

Blinds can be strengthened with leather where required to resist wear, and can be fitted with leather straps to fasten down securely.

### Sizes

The following are our standard sizes. Other sizes are made to order:—

Width in feet	4	4	4	5	5	6	6	6	6	7	7	7	8	8
Depth in feet	4	6	8	6	8	4	6	8	10	6	8	10	4	6
Width in feet	8	8	9	9	9	10	10	10	10	11	11	11	12	12
Depth in feet	8	10	6	8	10	4	6	8	10	6	8	10	4	6
Width in feet	12	12	14	14	14	16	16							
Depth in feet	8	10	6	8	10	6	8							



Showing Complete Verandah Blind Equipment.

### Inside Blinds

Spring Roller Blinds are made of best quality fadeless Lizard Holland. The best spring rollers are used, and are guaranteed.

All blinds that are not selvedge have hemmed sides, and are fitted with knot holder, cord and tassel.

Blinds are made plain or with pleating, or with scalloped fringe in colours of Beige, Nigger Brown, Cream, Green and Blue. When ordering, state whether pin or cloth measurement.



House Awnings Manufactured and Erected by Chandler's.

### House Awnings

These have top roller fittings with drum at one end. The cord winds round drum, and is pulled to roll up, or released to let down the awning.

A 1-inch galvanised pipe frame, fitted with hinges, holds the awning securely.

These hinges, which are either plugged or screwed to wall, are fitted half way down depth of blind.

The top roller fits into brackets, which are either plugged or screwed to wall.

Where necessary, a wooden weather box is fastened over awning, giving complete protection.

Through years of experience we have found that these awnings give better service than the Florentine blinds, as the latter are worked on a folding principle instead of the roller principle.

On account of the difficulty of folding canvas, it is almost impossible to fit the Florentine Blind under its protective cover, and it is consequently exposed to the weather, and wears more quickly.

Always be sure to give extreme width and depth of frame for awning.

### Fixing

Blinds are easily fitted to wooden frames, but where they must be fitted to either brick or concrete walls, it is more difficult to make a neat job.

However, our latest method is most satisfactory.

Lead screw anchors are drilled into the brickwork, and the screws are fitted into these. This makes a very strong, yet neat finish.

### Contract Department

We send our representatives to inspect, measure and report on jobs. Estimates are then submitted without any obligation on the part of the purchaser.

We can offer suggestions as to the best mode of fitting blinds, as our large experience has specially equipped us for this service.

On new homes, we advise the Architect to confer with the blind manufacturer before making the plans.

Most Australian buildings have blinds fitted, and the job is much more satisfactory when provision is made for plugging, etc., to receive blinds. Rings and staples should be concreted in on a brick house ready to receive the blinds.





## GEO. W. KELLY & LEWIS PTY. LTD. ENGINEERS

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36

S.A. File No.

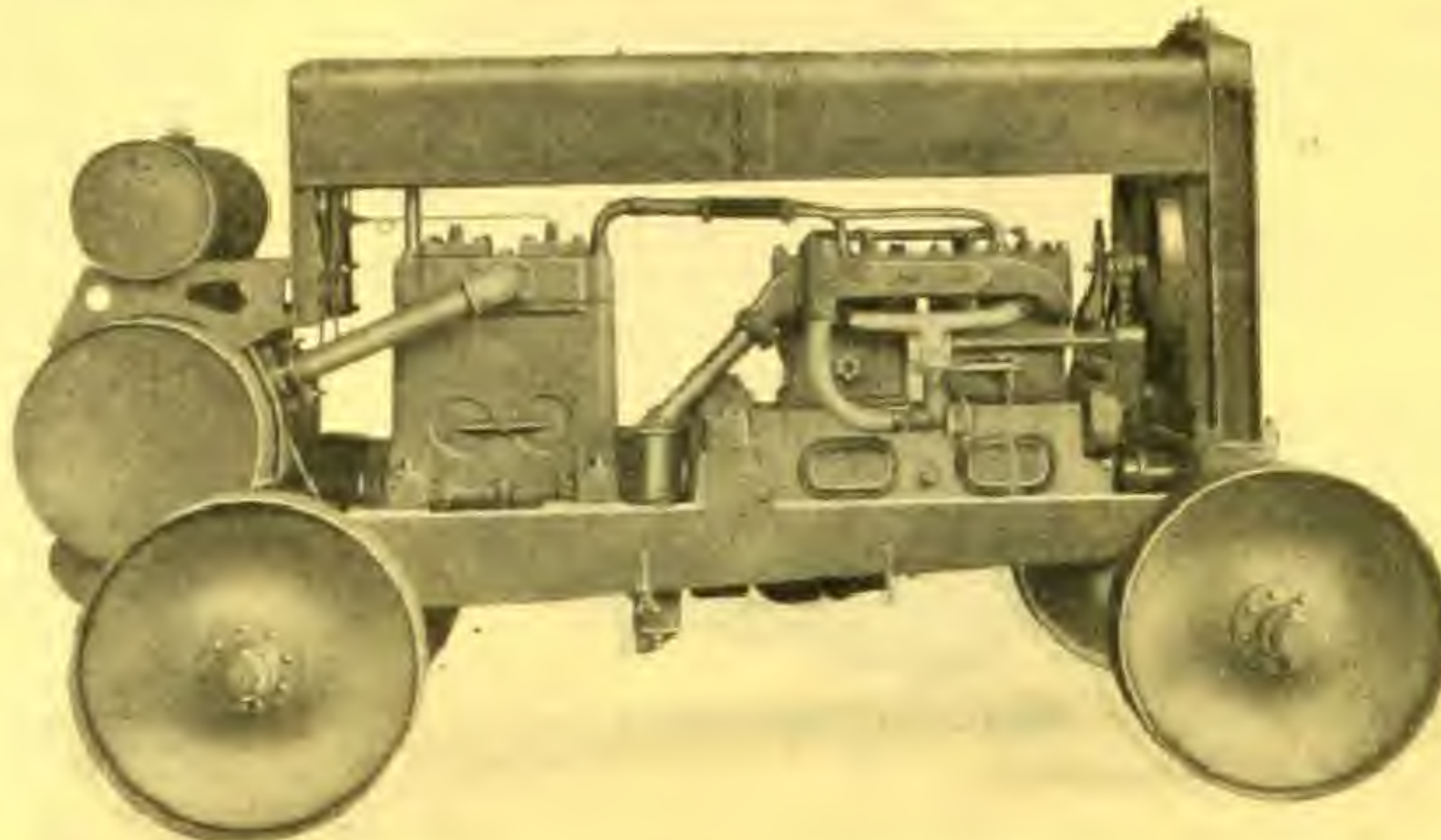
[For Other Products, See Pages 115 and 297]

### PRODUCTS

Air Compressors—both portable and stationary.  
Internal Combustion Engines and Special plant.

#### SPECIAL FEATURES:

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#### Uses for Air Power

Once an Air Compressor is available, its limit of work is found to depend only on the ingenuity of the user in selecting new labour-saving appliances.

Here are some of the best-known uses for air power:

**DEMOLITION WORK.**—On roads and buildings it is speedy, safe and cheap.

**CONSTRUCTION WORK.**—Drilling steel, wood boring, riveting, caulking, tamping, hoisting, grinding, air blast for furnaces, pile driving, etc.

**RENOVATING.**—Buildings, pipe work, castings, etc., by means of sand blast or wire brushes.

**PROCESS WORK.**—Operating pneumatic presses, aeration, displacement of fluids, pneumatic injectors.

**PAINTING.**—applied by air power, fills every crack or irregularity and thus imparts an added finish and durability to the surface.

Time and much money can be saved by employing Air Power.

#### A FEW USERS OF "K. & L." AIR COMPRESSORS.

Sydney Water Supply, Sewerage and Drainage Board—Stationary horizontal type.

Public Works Department, Sydney—Stationary horizontal type.

State Quarries, N.S.W.—Stationary horizontal type.

Melbourne & Metropolitan Board of Works (Water Supply)—Stationary steam drive horizontal type.

Williamstown Town Council—Stationary horizontal type.

State Rivers and Water Supply Commission—Portable horizontal type.

New South Wales Railways—Stationary horizontal type.

Federal Capital Commission—Portable vertical type.

Main Roads Board, N.S.W.—Portable vertical type.

Sydney City Council—Stationary horizontal type.

Bendigo Sewerage Authority—Vertical portable type.

Victorian Railways—Horizontal stationary vertical compound.

#### "K.L." Stationary Air Compressors

The "K.L." Stationary Air Compressor is of the straight line, single cylinder type. It is a self-contained machine, completely enclosed and automatically lubricated. It is fitted with two heavy flywheels, one of which is adapted to take belt drive.

#### Direct Steam Driven Type

Where a supply of steam is available, this type of compressor is recommended, being compact and efficient, having no belt or other drives to take up space and absorb power.

The compressor is arranged for a direct steam drive, with a steam cylinder interposed tandem between the main frame and the air compressing cylinder.



Stationary Horizontal Compressor.

(Continued on next page)



### Internal Combustion Engines

The Model "30" "K.L." Internal Combustion Engine is the result of over twenty years' experience in designing and manufacturing this type of engine, and this model has been placed on the market only after exhaustible testing under scientifically controlled conditions.

This engine is supplied in either 2, 3 or 4 H.P. sizes, and can be arranged for Hopper or Tank Cooling, for belt or chain drive, and for direct coupling to almost any type of machine.

The engine will run on either petrol or kerosene by suitably adjusting the carburettor.

The engine is of very neat design, the materials used are the best of their respective kinds and workmanship is of the highest grade throughout, thus ensuring a long life machine.



Model "30" Petrol-Kero Engine.

#### SPECIFICATION.

**Cylinder.**—The cylinder and upper half of crankcase are formed in one casting of Alloy Iron, which ensures an extremely smooth cylinder surface by grinding to close limits. The crankshaft is carried in the upper half of crankcase, running in high-pressure die-cast bearings.

**Base.**—The lower half of crankcase forms the oil sump and is provided with an oil gauge.

**Cylinder Head and Valve Gear.**—The cylinder head, of special non-detonating type, is water-jacketed and fitted with correctly designed inlet and exhaust ports. Valves are in the head and operated through high tensile bronze rockers, fitted with hardened steel tappets, by steel push rods.

**Crankshaft Connecting Rod and Piston.**—The crankshaft is specially balanced and of high-grade steel, drop-forged, and ground to close limits.

**Connecting Rod** is of H-section high-grade steel, drop-forged.

**The Piston** is of "Alloy Iron," ground to fine limits and provided with three piston rings.

**The Gudgeon Pin**, of full floating type, is of high-grade hardened steel, ground to fine limits.

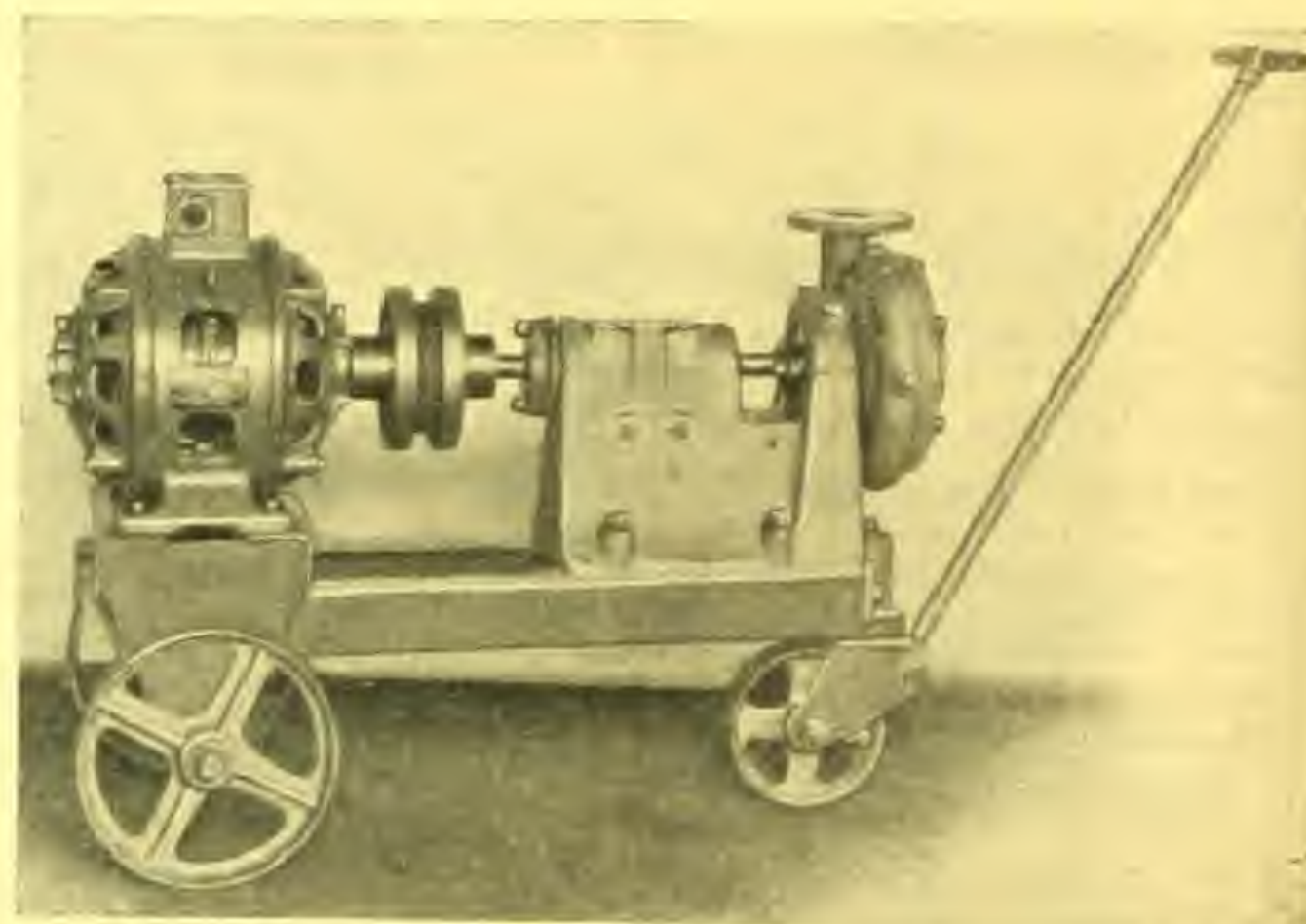
**Camshaft and Gears.**—Of fine quality drop-forged steel; cams integral with shaft. Gears are of drop-forged steel, helically cut.

**Governor and Magneto Unit.**—Governor is of centrifugal type, totally enclosed, and adjustable from outside while engine is running. Magneto is of British manufacture, high-tension, rotary type.

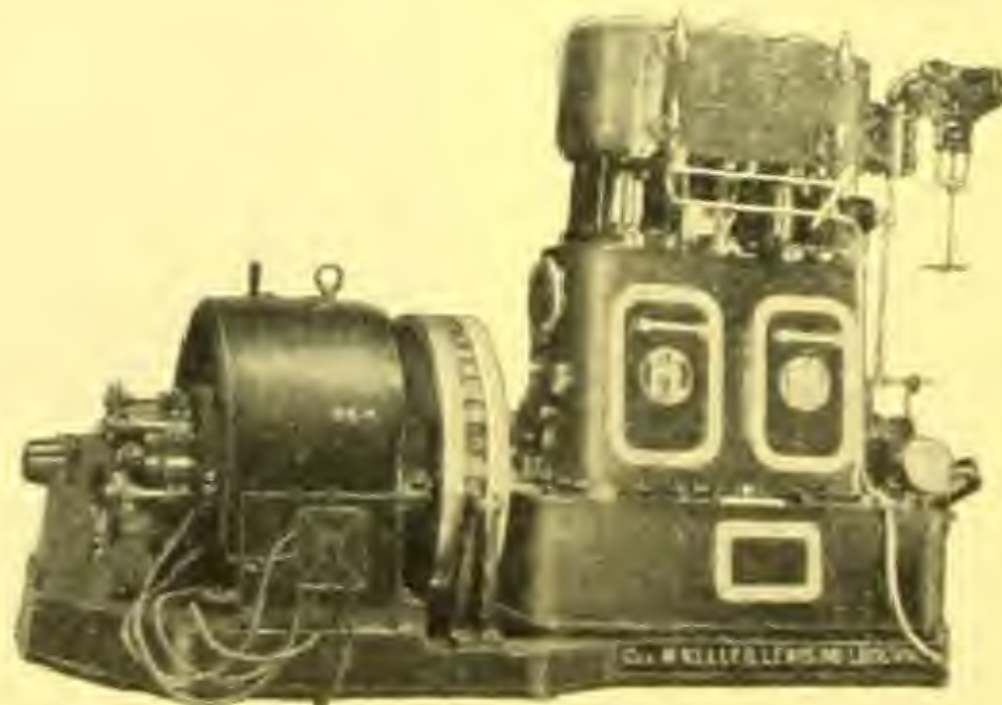
**Carburettor.**—Metal float type, with sliding choke tube and extra-air control.



Vertical High-Speed Direct-Coupled  
Generating Sets.



Portable Pump and Electric Motor Unit.



### High-Speed Steam Engines and Generating Units

Geo. W. Kelly & Lewis Pty. Ltd. have had considerable experience in the manufacture of high-speed steam engines, and have a number of very successful installations to their credit.

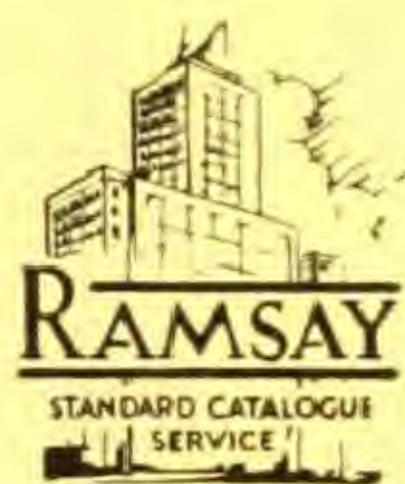
Illustrated are some high-speed engine-driven generating units. They are of very neat design, both internally and externally, a feature of all K. & L. products.



## SECTION R

[Containing S.A.A. Filing Sections Nos. 37, 38 and 39]

# INSULATION & ACOUSTICS





G.P.O. Box 3248P.

Sydney, N.S.W.

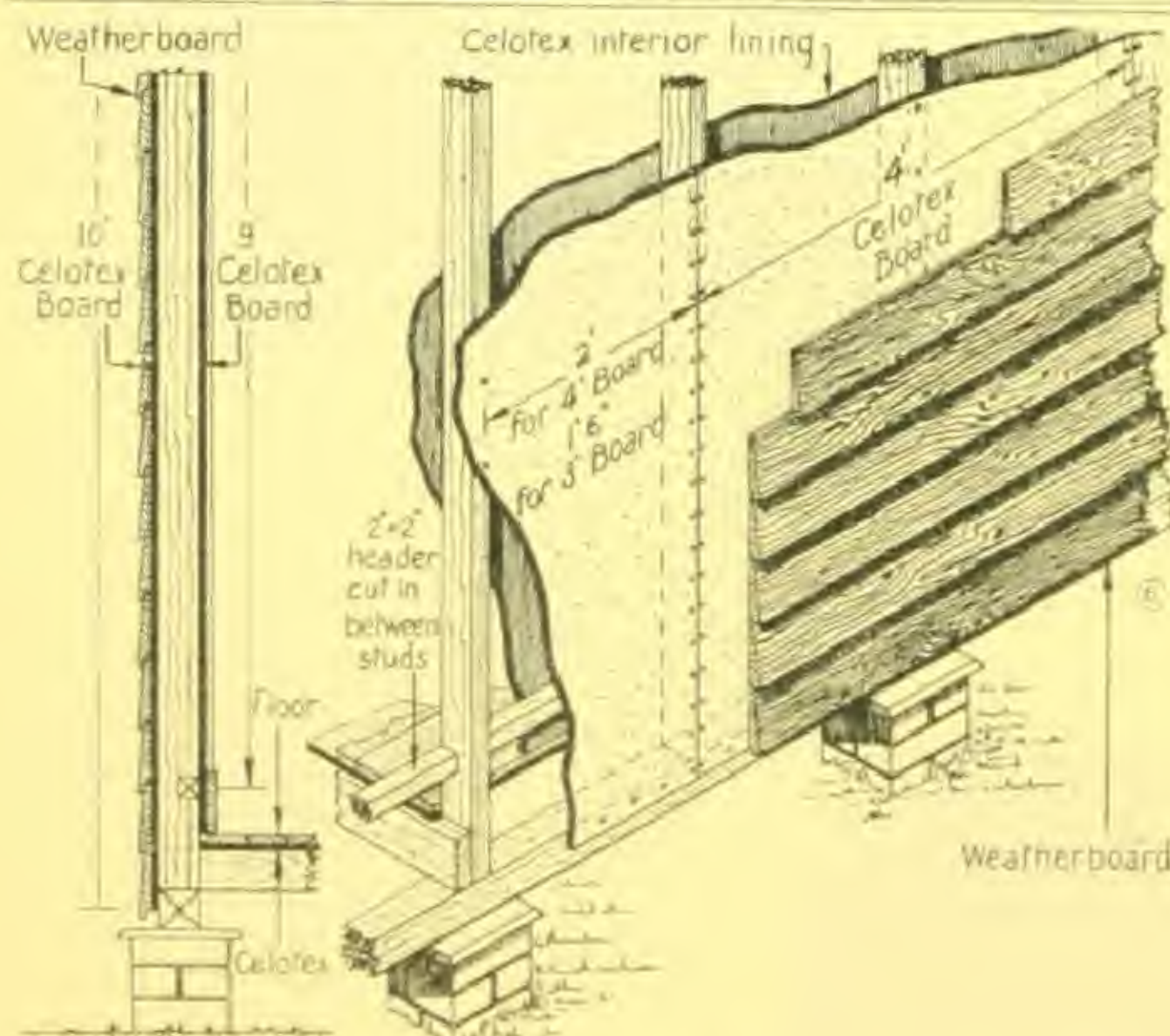
**CELOTEX**  
BRAND  
INSULATING CANE BOARD

Manufactured by  
**THE CELOTEX COMPANY**  
919 North Michigan Avenue,  
Chicago, Ill., U.S.A.

MILLS:  
New Orleans, La., U.S.A.

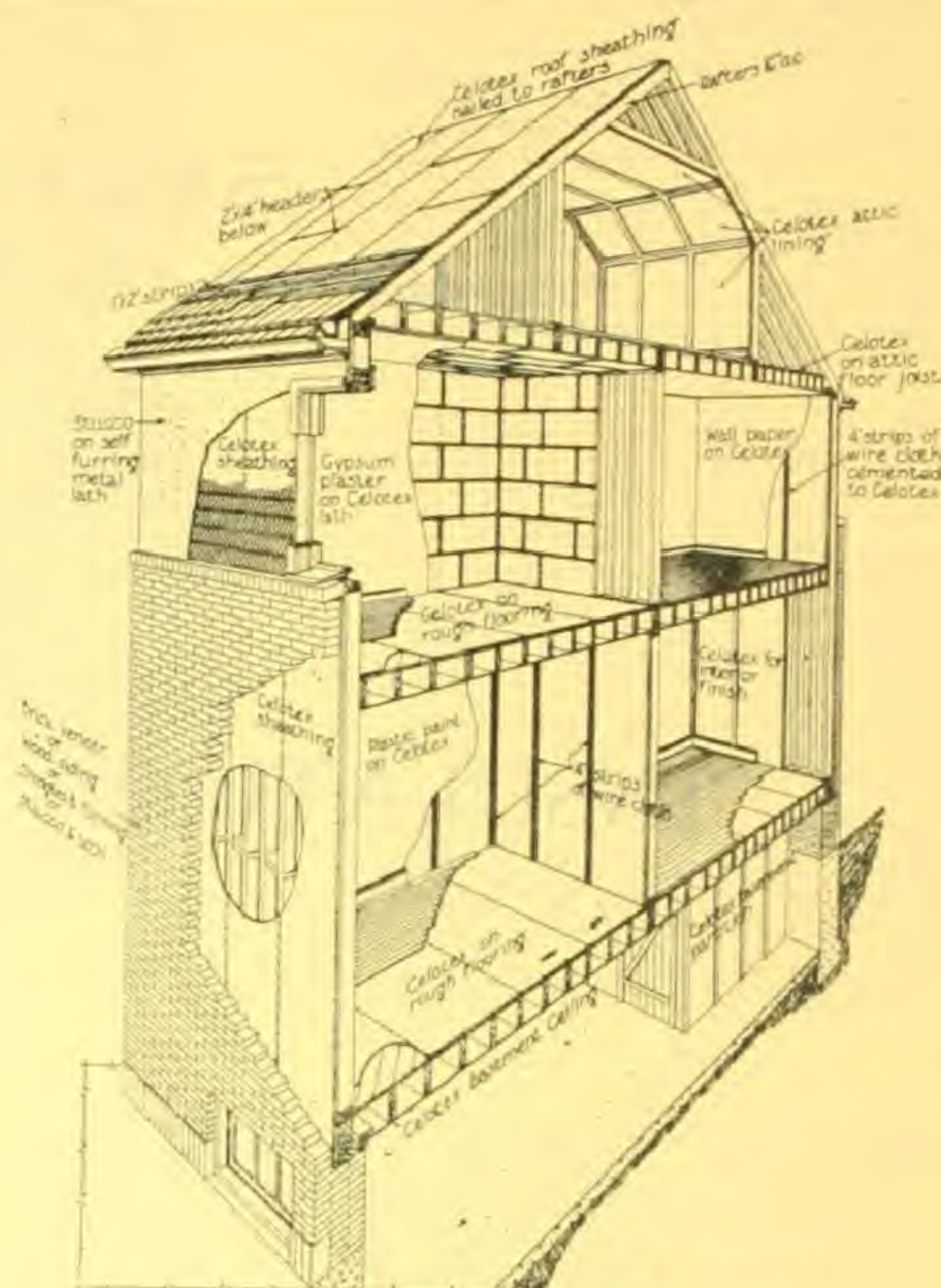
## CELOTEX PRODUCTS

Celotex Standard Building Board, Celotex Lath and 1 in. Celotex Linoleum Base are stocked by most Celotex Distributors in Australia and New Zealand. Celotex Products marked ® are available on indent order placed 60 to 90 days before required.



DRAWING A12 (a)

Celotex as sheathing (exterior lining) under weather-boards provides insulation, strength in construction and quiets outside noise. See paragraph A12.



SECTION OF BUILDING SHOWING TYPICAL USES OF CELOTEX

From the basement to the attic Celotex has a definite place in the construction of walls, ceilings and partitions. On the outside of buildings as a covering for walls, on its own or as sheathing (exterior lining), under galvanized iron, asbestos cement sheets, weather-boards, rough-cast, or brick veneer. Under roof coverings as sarking or roof sheathing. As an interior lining for walls and ceilings in its natural finish, or decorated, or as a base for plaster. In these uses Celotex is not only a material of construction, it also insulates and quiets sound. In roofs, in walls, in ceilings, in floors (under floorings, or under floor coverings), Celotex both insulates and quiets sound.

## SPECIFICATIONS

GOVERNING THE APPLICATION OF  
CELOTEX AND ACOUSTI-CELOTEX

(ISSUED SEPTEMBER, 1931)

	Page
Section A.—Exterior Walls	497
Section B.—Roof Insulation	499
Section C.—Floors: Insulating—Quieting—Lining	501
Section D.—Interior Linings—Walls—Ceilings	503
Section E.—Decorative Treatments over Celotex	509
Section F.—Acousti-Celotex	510

While reasonable care only is required for fixing Celotex, all directions given herein have been tested and proven in actual construction and are, therefore, of the utmost importance. To assure the results that users have a right to expect from this remarkable building material, these specifications should be carefully observed in every particular.



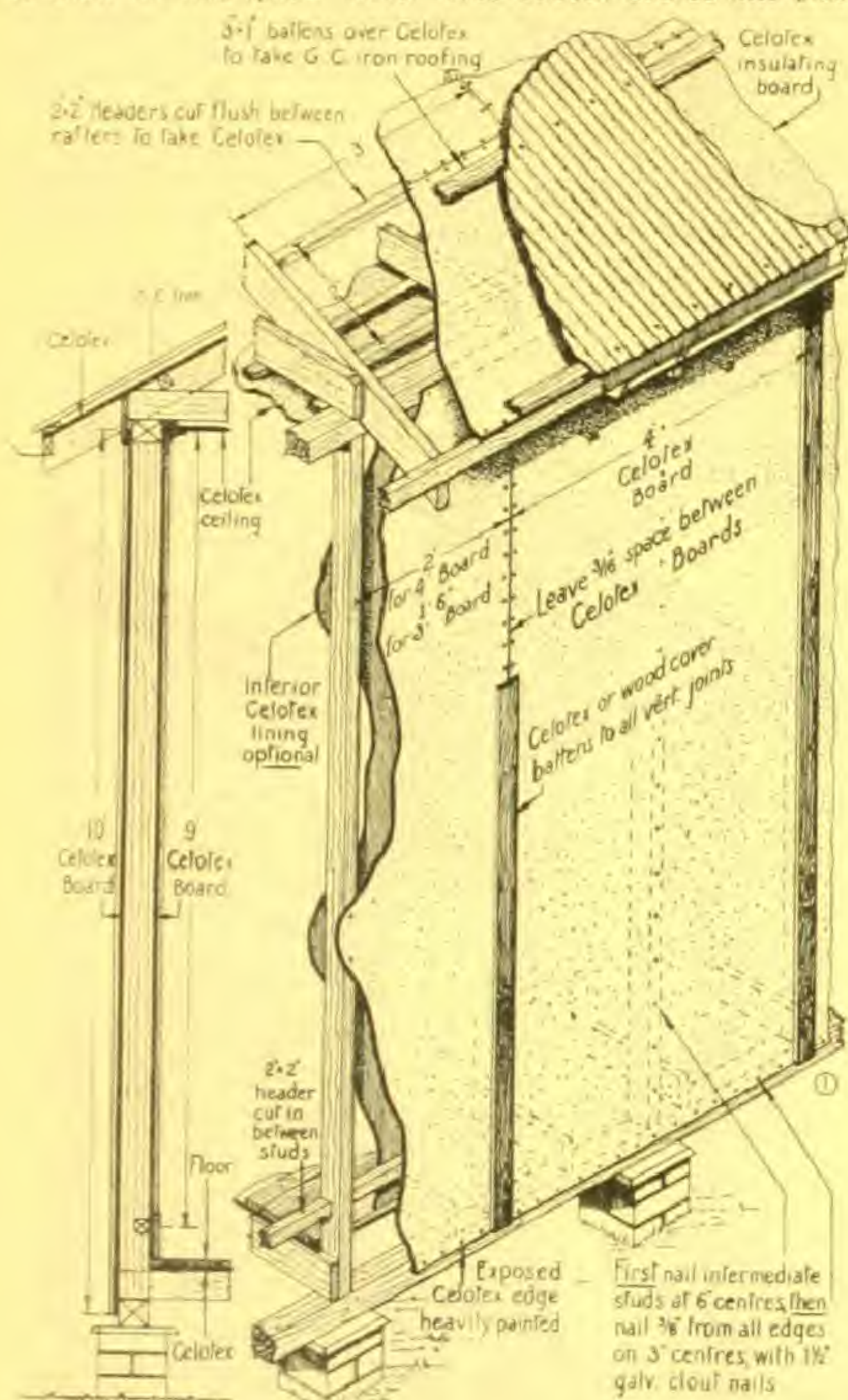
## SECTION A—EXTERIOR WALLS

How to use Celotex for building exterior walls; as a base for plastic paint, rough-cast or stucco, as sheathing (exterior lining) under weather-boarding, galvanized iron, asbestos cement, rigid shingles, brick or stone veneer; and as insulation and sound-quieting in all forms of exterior wall construction. Walls built with Celotex have greater bracing strength against distortion than walls built with horizontal weather-boarding.

**A1. EXTERIOR WALLS.—FRAMING:** Space studs on 12 in., 16 in. or 18 in. centres for substantial construction; where necessary, cut in headers (solid strutting or nogging) between studs to provide a firm nailing base along all Celotex Board edges (both ends and sides); this is important and should not be overlooked. Studs in less substantial construction may be spaced on 24 in. centres.

**A2. EXTERIOR WALLS.—DAMPENING:** Lightly sprinkle Celotex with clean water 24 hours before fixing. Sprinkle one side of Board only, stacking flat in a pile. Fix Celotex promptly and finish all nailing immediately after removing from dampened pile. Keep Celotex clean.

**A3. EXTERIOR WALLS.—FIXING:** Nail Celotex vertically over studs. Leave  $\frac{3}{16}$ ths inch space between adjoining Boards both ends and sides. Celotex is made scant in width and length to allow for this space. Never force Celotex Boards into place.



DRAWING A3

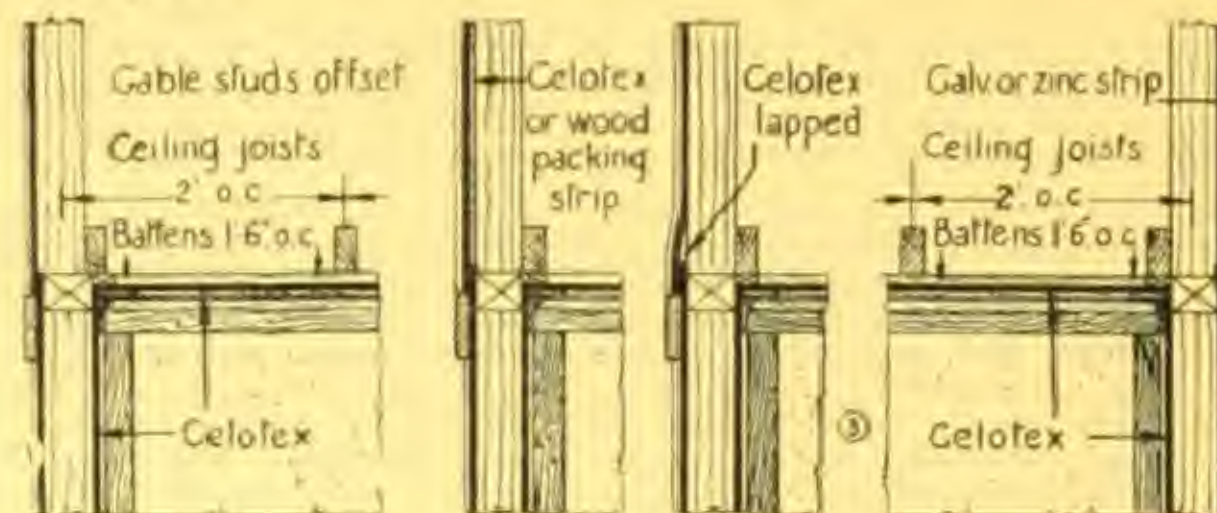
For substantial construction frame studs accurately on 16 in. centres, using boards 4 ft. wide; or on 18 in. centres, using boards 3 ft. wide; for less substantial construction frame studs accurately on 24 in. centres. Dampen boards 24 hours before fixing. Follow fixing instructions carefully. Prime (or glue size), then paint all surfaces of Celotex exposed to the weather before fixing cover battens over Board joints. Thoroughly prime and paint all exposed Celotex edges.

**A4. EXTERIOR WALLS.—NAILING:** Begin at top of each Board; first nail Celotex to intermediate studs, then around edges (both sides and ends) with  $\frac{1}{2}$  in. galvanized clout nails, 10 or 12 gauge,  $\frac{3}{4}$  in. heads (380 nails required to fix each 100 sq. ft. of Celotex wall surface). Space nails 6 in. apart over intermediate studs, 3 in. apart along edges and ends and  $\frac{3}{4}$  in. away from all edges. Drive clout nail heads slightly below Celotex surface.

**NOTE.**—Over hardwood framing use galvanized clout nails  $\frac{1}{2}$  in. long, as directed above. Use  $\frac{3}{4}$  in. clouts for double-thick Celotex Boards. Any Boards spaced less than  $\frac{3}{16}$ th in. at joint or at top or bottom of Boards should be cut open to  $\frac{3}{16}$ th in. After fixing, rectify any surface unevenness, particularly at Board joints, with sandpaper.

**A5. EXTERIOR WALLS.—GABLE ENDS:** Fix as directed above. Provide a firm nailing base for all Board edges (both ends and sides). Prime (or glue size), and paint, see A9. Finish with or without battens, half-timbered construction, or with a continuous surface of plastic paint A10, or rough-cast A11.

**A6. EXTERIOR WALLS.—HORIZONTAL JOINTS:** When it is necessary to use two or more Board lengths to cover wall height (particularly gables), it is recommended that upper studs be offset or packed-out and that Celotex Boards at horizontal joints be lapped; or a galvanized iron, copper or zinc flashing may be bent into the joint as indicated in Drawing A6.



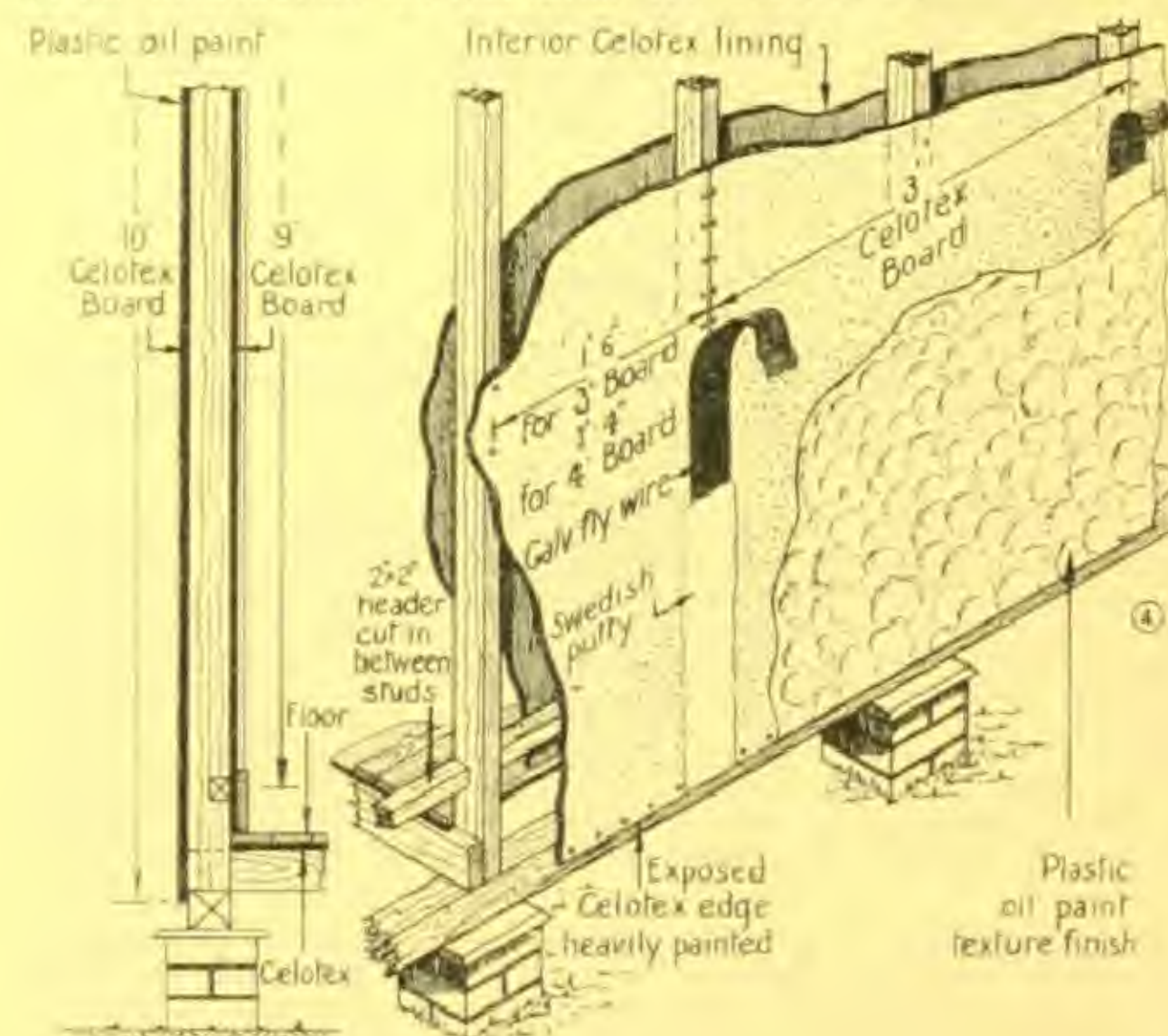
DRAWING A6

Exterior horizontal joints of Celotex made weather-proof. Done in four ways by offsetting studs; by packing studs with Celotex or wood strips; by lapping Celotex without offsetting or packing studs; or by inserting zinc or galvanized flashing strip at horizontal joints. Thoroughly prime and paint all exposed Celotex edges, see A9.

**A7. EXTERIOR WALLS.—EAVES LINING:** Cut Celotex to fit eaves; frame with 2 in. x 1 in. battens on 18 in. centres, providing a substantial nailing base at all Board edges; glue size and paint before fixing; put into place and fix from scaffolding or ladder.

**A8. EXTERIOR WALLS.—COVER BATTENS:** Prime (or glue size) and paint Celotex before fixing 3 in. x 1 in. wood or 3 in. x  $\frac{1}{2}$  in. Celotex battens over Board joints. Old English half-timbered construction may also be used, the diagonal or curved battens nailed securely into studs or headers. Battens may be painted, oiled or stained before fixing. Before fixing battens and wood trim, paint back of battens and trim with thick oil paint and nail into place while the paint is wet.

**A9. EXTERIOR WALLS.—PAINTING:** First prime (or glue size) Celotex, then use two coats of any approved exterior oil paint; glue size and paint Celotex before fixing cover battens, half-timbered construction or exterior wood trim. Prime (or glue size) and thoroughly paint all surfaces of Celotex exposed to the weather, especially exposed lapped edges of horizontal joints; all edges of Boards at bottom of walls either exposed or covered with base board; all edges of Celotex verandah panels, sun blinds, cover battens, wood trim, etc. For additional information on painting, see Section E.



DRAWING A10

Plastic paint provides a continuous textured surface without cover battens for either exterior or interior Celotex walls. Frame on 16 in. or 18 in. centres. Follow instructions carefully. Exercise extreme care choosing an exterior plastic paint; select one known to be satisfactory for exterior use; formula in E12 can be recommended.

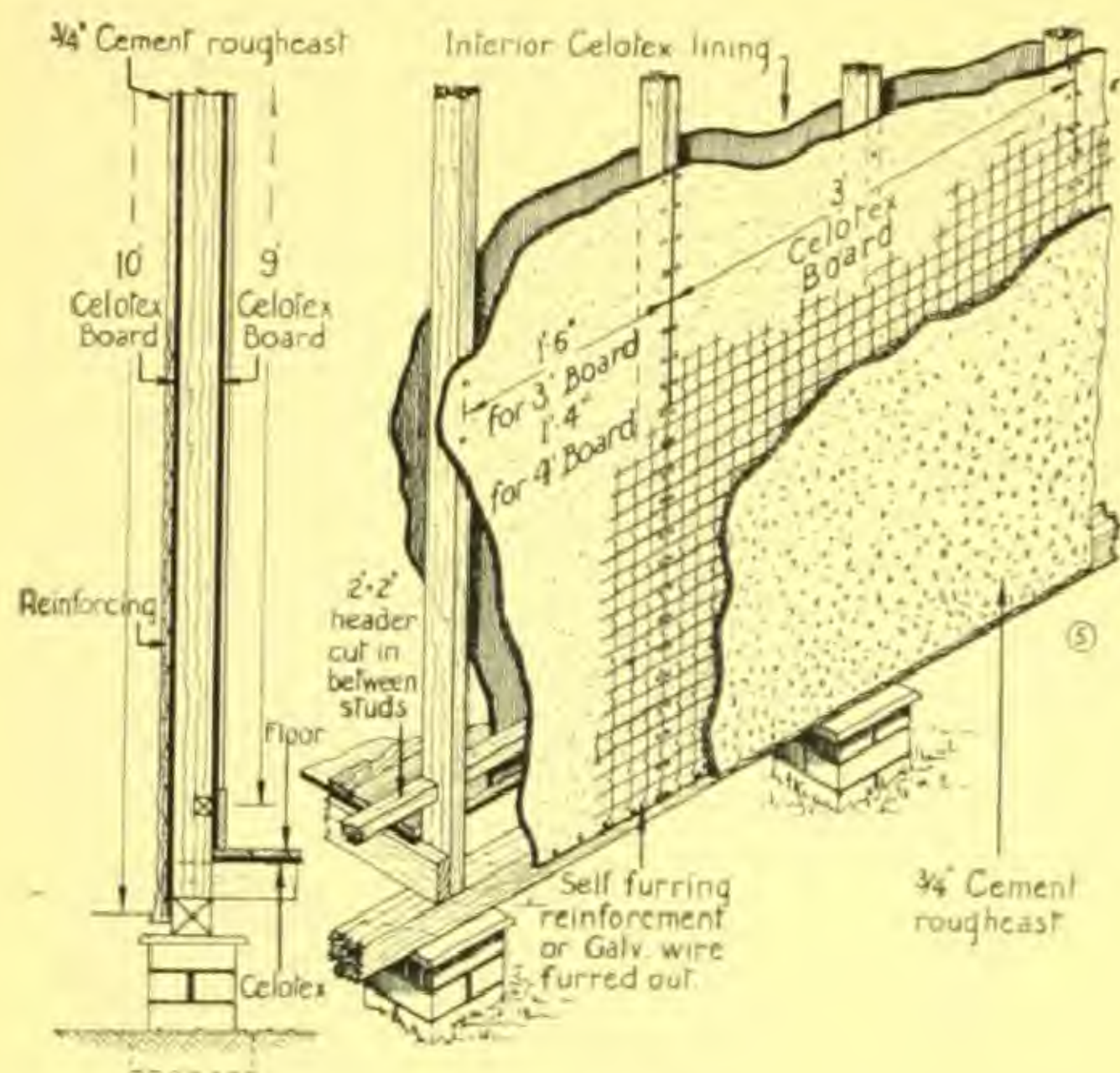
**A10. EXTERIOR WALLS.—CELOTEX AS A BASE FOR PLASTIC PAINT:** Frame, dampen and fix Celotex Boards as directed for substantial construction. Any Boards spaced less

(Continued on next page)



than 3/16th in. at joints or at top or bottom of Boards should be opened up to 3/16th in. Reinforce plastic paint at all Board joints and corners with a 6 in. strip of galvanized flywire. With coarse sandpaper smooth down a strip 7 in. wide, about 1/16th in. below Board's surface, over all exposed joints and corners, then cover with strips of galvanized flywire 6 in. wide, cementing the wire strips with Swedish Putty. Hold the wire strip with one hand (do not nail into place), work the Swedish putty through the wire mesh into close contact with the Celotex, using a trowel or scraping knife. Spread the Swedish putty beyond both edges of the flywire for at least an inch, so that the wire edges will not show through the plastic paint. Avoid building up the Swedish putty underneath the galvanized flywire. Reinforce all interior and exterior angles, also joints and angles between masonry walls and Celotex, with 6 in. strips of galvanized flywire bent over or into corners and cemented as directed above. Allow wired joints and angles to set or dry at least one day. Before sizing or painting, inspect wired joints and angles to be sure that they are securely fixed and that they present a smooth wall surface. Board joints that are covered with battens or old English half-timbered construction need not be wired. Prime (or glue size) Celotex before applying plastic paint. See Drawing A10, also Section E10, E11, and E12 for Swedish putty and plastic paint formula.

**A11. EXTERIOR WALLS.—ROUGH-CAST:** Frame, dampen and fix Celotex as directed for substantial construction. Portland cement rough-cast should be reinforced with 16 gauge galvanized wire mesh or expanded metal lath, furred out with either 3/16th in. wood triangular furring strips or 3/16th in. metal furring (wire) tacked over Celotex the length of each stud. Then nail or staple the wire or metal reinforcing over the entire Celotex surface; securely nail or staple the wire or metal reinforcing through Celotex into the wood frame. Apply rough-cast according to usual practice not less than 1/2 in. thick.



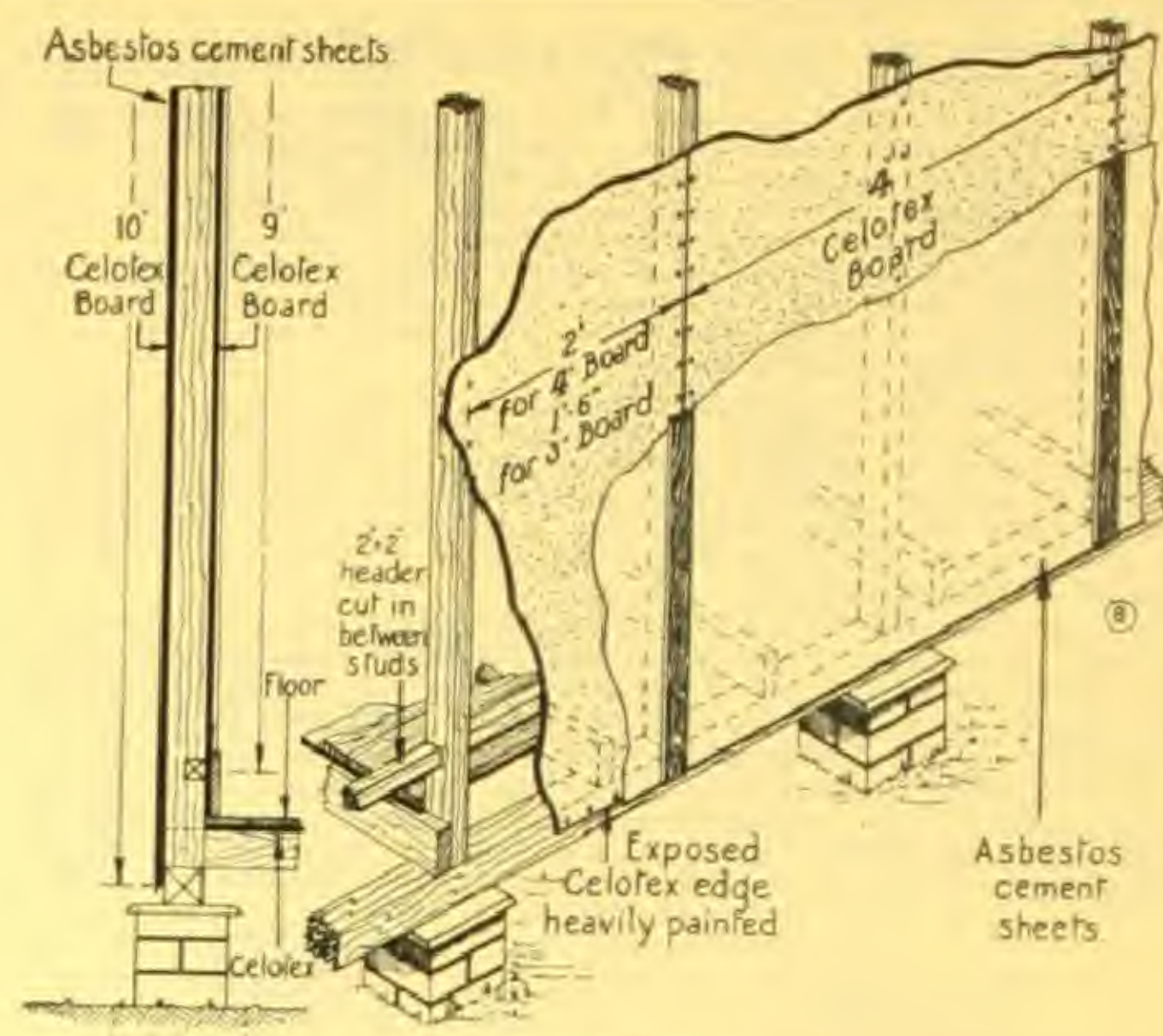
DRAWING A11.

Reinforced Portland cement stucco (rough-cast) with 16 gauge galvanized wire or expanded metal lath furred out 3/16th in. from surface of Celotex. Frame on 16 in. or 18 in. centres. Follow instructions A11 carefully.

**A12. EXTERIOR WALLS.—CELOTEX FOR EXTERIOR LINING AND FOR INSULATION:** Fix Celotex as directed over all exterior wall framing. Over Celotex fix weather-boarding, galvanized iron, asbestos cement sheets or rigid shingles in the usual way; use nails of sufficient length to enter the studs, headers or battens at least one inch. Bring vertical and horizontal joints of the walling material over studs and/or headers as far as possible. For weather-boards, see Drawing A12 (a); for asbestos cement sheets, see Drawing A12 (b). For wood or rigid shingles nail 2 in. x 1 in. battens securely to studs over the Celotex wall; space battens to fit length of shingle used. Fix shingles in the usual way. See page 496 for Drawing A12 (a).

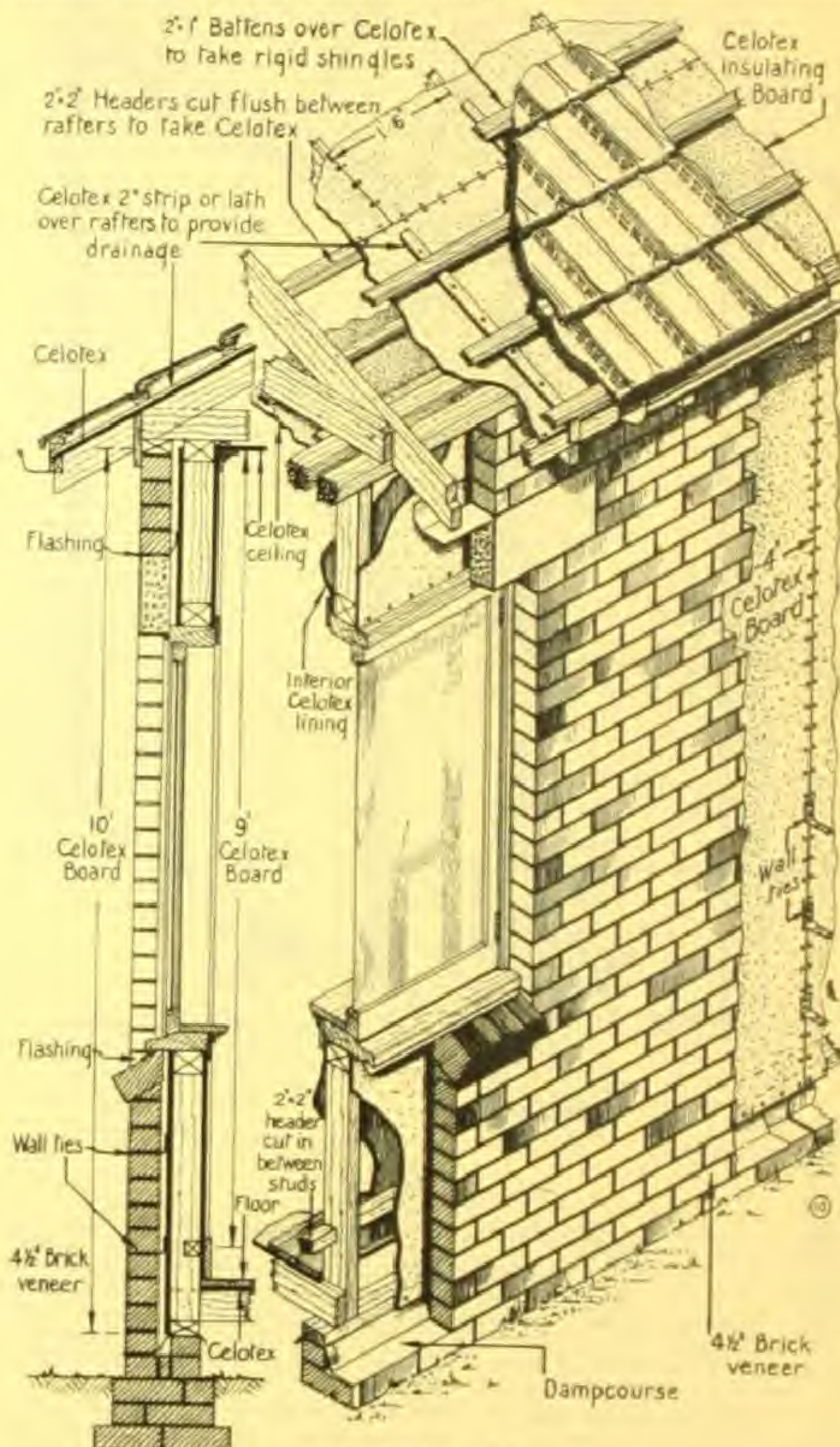
**A13. EXTERIOR WALLS.—BRICK OR STONE VENEER:** Fix Celotex over all exterior wall framing as directed. For brick or stone work nail metal ties or anchors every 12 inches over Celotex into studs. Lay brick or stone in the usual manner. Allow not less than 3 in. space between Celotex exterior lining and the brick or stone veneer. Exterior walls may be framed without Celotex on outside of framing, but for substantial construction it should not be omitted. If Celotex exterior lining is omitted, use Celotex for interior linings to give walls structural strength.

Celotex used in Exterior Walls, provides  
Strength, Insulation and Sound-Quitting.



DRAWING A12 (b).

Exterior walls of asbestos cement need Celotex sheathing to keep out summer heat, winter cold and noise. In buildings already built, Celotex linings will serve the same purpose, applied directly over existing linings.



DRAWING A13.

Celotex as exterior lining under brick or stone veneer. All the advantages of a brick exterior with added strength and comfort provided by Celotex and frame walls. Costs less than a double-thick exterior brick wall.

(Continued on next page)

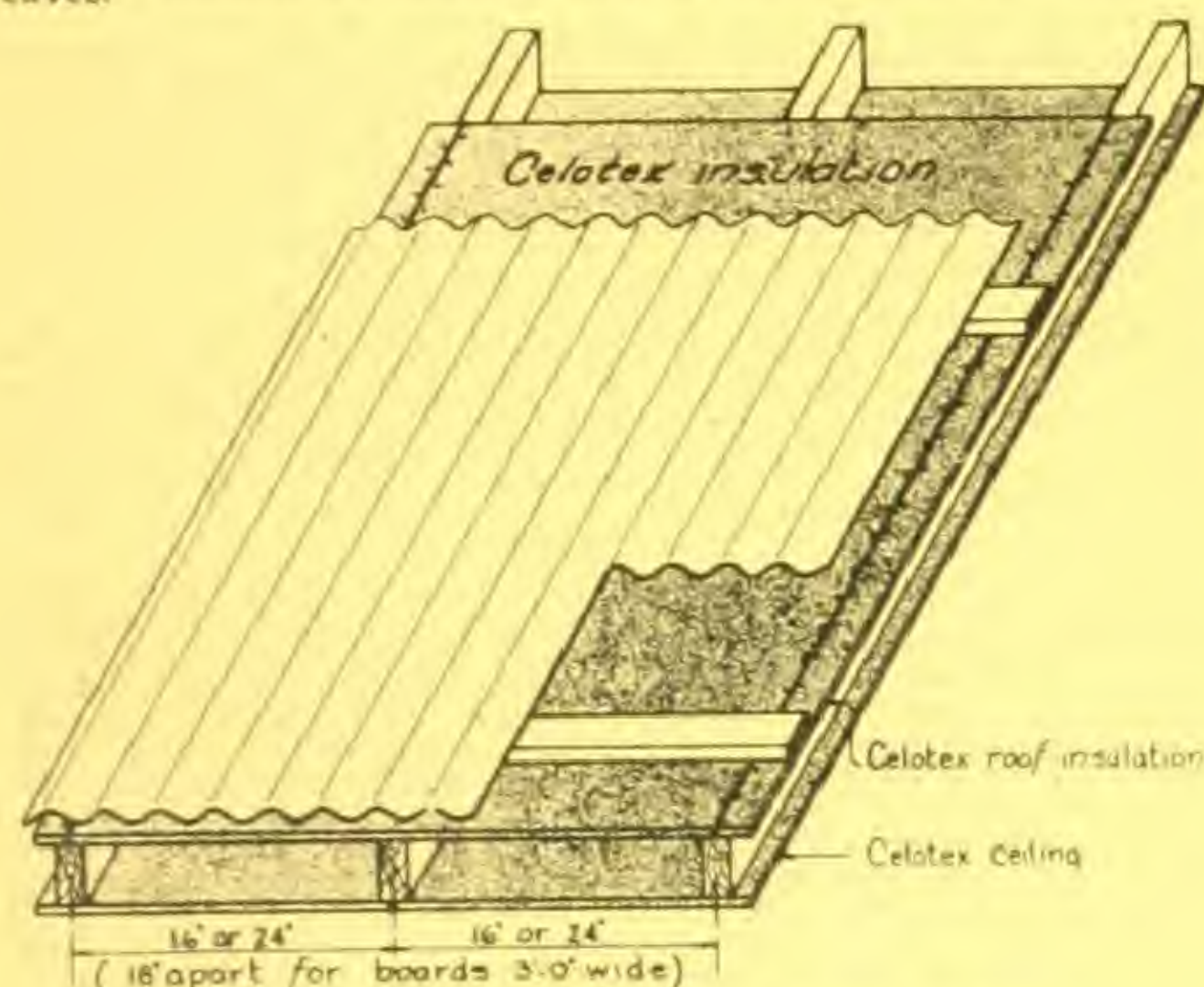


## SECTION B—ROOF INSULATION

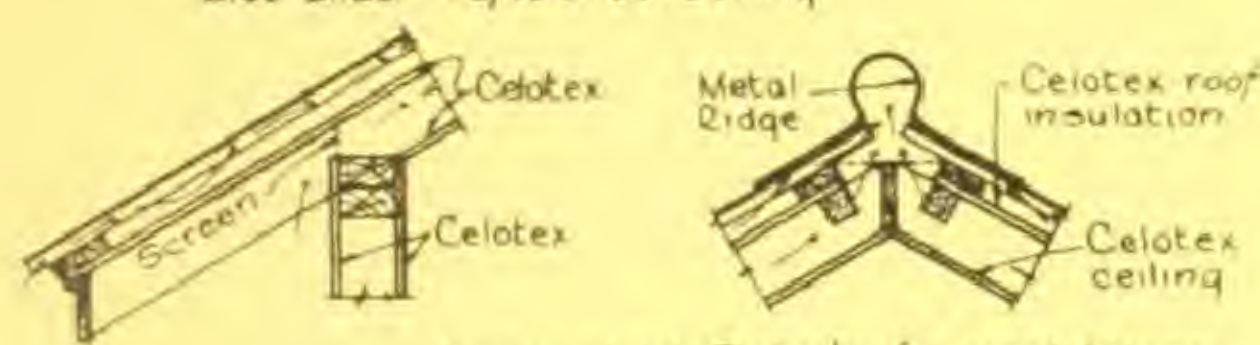
How to use Celotex for roof insulation, to stop heat leaking into or out from buildings with either pitched or flat roofs. Roof insulation saves fuel, prevents condensation, protects from outside heat and cold, and reduces expansion of concrete roof decks.

**B1. PITCHED ROOFS.—FRAMING:** Celotex may be fixed either—(X) lengthwise of or across rafters, (Y) cut in between roof rafters, or (Z) as a lining on the under side of roof rafters. In any way that Celotex roof insulation may be applied, firm nailing bases on 16 in., 18 in. or 24 in. centres are necessary along all Board edges (both ends and sides) either lengthwise of or across Celotex Boards. It is usually more economical to lay out framing to fit stock sizes of Celotex, but there is no objection to cutting Celotex to meet framing requirements. The two widths and many lengths of Celotex obtainable permit framing to take Boards either lengthwise, crosswise, or both ways of any roof insulation job. See Drawings B5 and B6.

**B1 (X1).—**When rafters are spaced REGULARLY on 12 in., 16 in., 18 in. or 24 in. centres, cut in headers (solid strutting or nogging) between rafters at horizontal Board joints, ridge and eaves, to provide a firm nailing base. (X2) When rafters are spaced IRREGULARLY OR WHEN SPACED ON MORE THAN 24 in. CENTRES, either put in extra rafters where necessary, as in (X1), or cut in headers between rafters on not more than 24 in. centres and at horizontal Board joints, ridge and eaves. (Celotex 4 ft. wide will be found most economical for this purpose.) Roofs not over 14 ft. from eaves to ridge, with rafters regularly spaced on not more than 24 in. centres, require no headers, only a nailing base at ridge and eaves.



Celotex in roofs under galvanized iron or tile, also under rafters as ceiling



Suggested Details for ventilation

DRAWING B1.

(X). Without Celotex insulation, galvanized iron roofs are cold in winter, hot in summer and noisy during rain storms. Rooms and attics under iron roofs may be made comfortable and livable with Celotex over roof rafters, or under roof rafters, or both as illustrated. Under iron roofs provide ventilation at ridge.

**B1 (Y).—**When Celotex insulation is cut in between rafters there is usually some reason why it is not desirable to fix Celotex on the underside of rafters. It is then fixed to existing framing, cutting in headers where necessary for a nailing base. The under side of roof sheathing, sarking or wood decking provides a firm nailing base between rafters. When Celotex is cut in between rafters spaced on not more than 24 in. centres (Y1) nail Boards to battens and toe-nail long edges into place along rafters. Or (Y2) support in place by nailing long edges of Celotex securely to 1 in. x 1 in. fillets and then nail fillets to rafters and Board ends to battens; see Drawing C9. Or (Y3) cut Celotex wide enough so that it may be arched or sprung between rafters, the long edges toe-nailed into place along rafters and Board ends tightly lapped 4 in. or more; see Drawings C8 and C11. Or (Y4) when either rafters or battens are spaced on more than 24 in. centres insert 3 in. x 1 in. battens spaced between existing battens, where necessary, to provide a firm intermediate nailing base, fixing Board as in (Y1) or (Y2).

**B1 (Z).—**When Celotex is to be fixed on the underside of roof rafters, provide a firm nailing base for all Board edges (ends and sides) together with intermediate nailing bases either lengthwise or crosswise of Celotex on 16 in., 18 in. or

24 in. centres. Consult for framing D2; dampening D8; texture D9; fixing D10; and nailing D11.

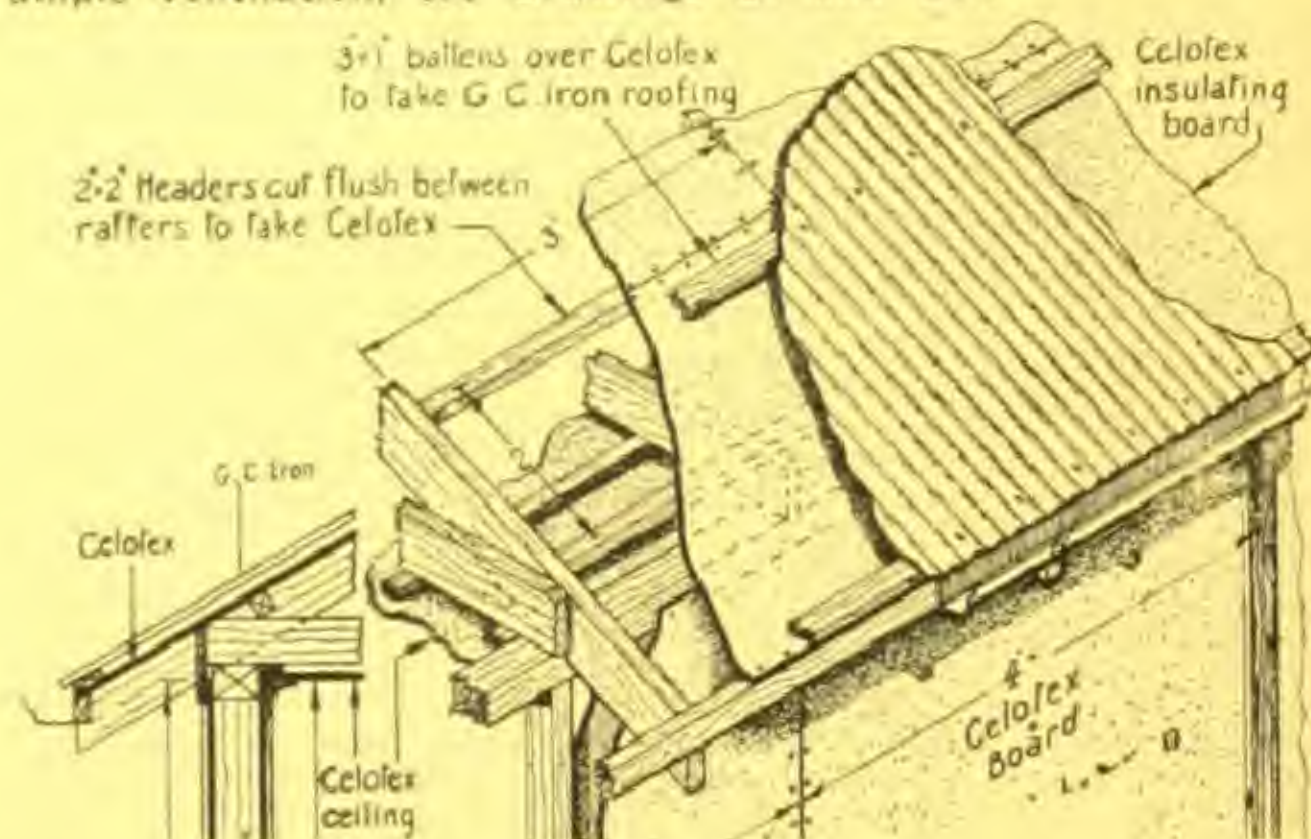
In addition, when fixing Celotex roof insulation, extend it to a tight joint with the wall insulation (if any) or wall plate and carefully close all spaces under eaves and gable ends where hot or cold air leakage may occur. With Celotex insulation on the underside of rafters under corrugated galvanized iron roofs make adequate provision for ventilation at roof ridge with ventilating ridging and provide for the free passage of an air current between iron roof (or roof sarking) and Celotex lining on underside of rafters at both eaves and ridging. Louvres should always be provided, to be open in summer and shut in winter, for ventilation. Openings at ridge for ventilation should also open and close. Ample ventilation should always be provided under pitched roofs. See Drawings D17 and B1.

**B2. PITCHED ROOFS.—DAMPENING:** When Celotex is to be fixed on top of pitched roof rafters, lightly sprinkle Boards with clean water 24 hours before fixing. Sprinkle one side of Board only, stacking flat in a pile. Fix Celotex promptly and finish all nailing immediately after removing from dampened pile. Keep Celotex clean. When Celotex is to be cut in between rafters, do not sprinkle. Consult D8 before fixing on the underside of roof rafters.

**B3. PITCHED ROOFS.—FIXING:** Nail Celotex securely to a firm nailing base provided to receive it. When Celotex is fixed on top of pitched roof rafters leave 3/16th in. space around all Board edges (both ends and sides). Celotex is made scant in width and length to allow for this space. Either vertical or horizontal Board joints securely fixed to a nailing base are tight against ordinary roof leakage caused by driving rain, condensation, etc., but a waterproof horizontal joint may be constructed as follows—Chamfer the horizontal Board joint edges to a 45 degree angle, provide a drip or flashing strip of galvanized iron bent to fit the chamfered joint edges and insert under the top and over the lower Board, entire length of horizontal joint. The width of the galvanized iron strip will depend on roof pitch. See Drawing D17 for flashing strip.

**B4. PITCHED ROOFS.—NAILING:** Begin at top of each Board, first nail to intermediate rafters, headers or battens, then around all Board edges (both sides and ends) with 1 1/2 in. galvanized clout nails, 10 or 12 gauge, 3/4 in. heads (380 nails required to fix each 100 sq. ft. of Celotex pitched roof surface). Space nails 6 in. apart over intermediate rafters, headers or battens, 3 in. apart along edges and ends, and 2 in. away from all edges. Drive clout nail heads slightly below Celotex surface. Over hardwood framing use galvanized clout nails 1 1/2 in. long, as directed above. Use 2 1/2 in. clouts for double-thick Celotex Board. Any Boards spaced less than 3/16th in. at joints or at top or bottom of Boards should be cut open to 3/16th in. Protect from damage during fixing. Celotex does not provide a working platform; it is suggested that light-weight, flat ladders (cat ladders) be used by workmen over Celotex pitched roofs.

**B5. PITCHED ROOFS.—CELOTEX UNDER CORRUGATED GALVANIZED IRON:** Fix Celotex over rafters, as directed in B1 to B4 inclusive. Over Celotex Insulation fix 3 in. x 1 in. battens at right angles to rafters, spaced to accommodate the lengths of iron used. Fix iron roofing in the usual way securely to battens. Do not lay iron directly on top of Celotex; always use battens between iron and Celotex. To provide drainage in case of roof leakage or condensation, fix a 2 in. Celotex strip or a wood lath over Celotex along each rafter. (See Drawing B6), then fix 3 in. x 1 in. battens as above. See B3 for making a watertight horizontal joint. Provide ample ventilation, see Drawings B1 and B17.



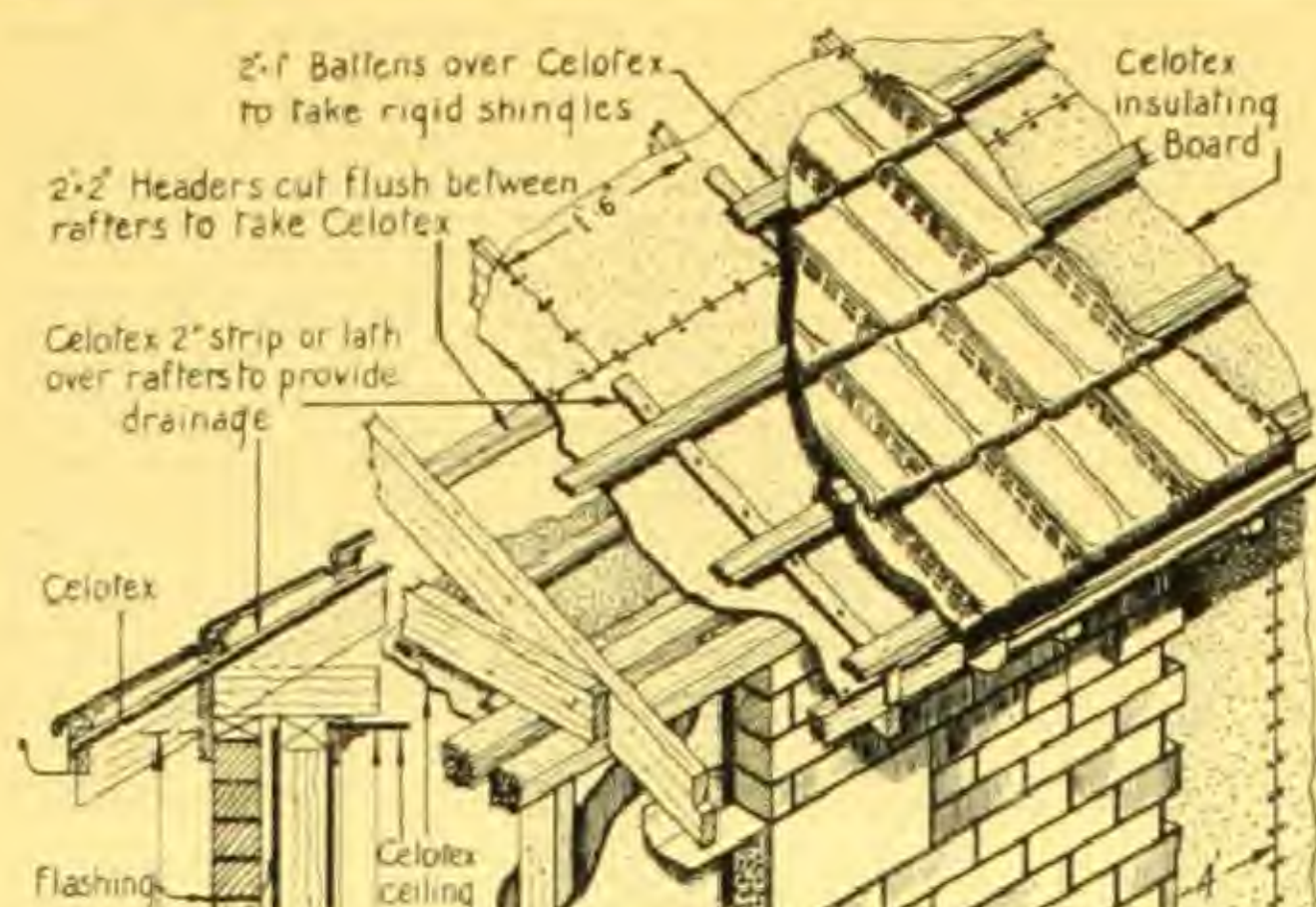
DRAWING B5.

Fix Celotex Boards over roof rafters, either vertical, or horizontal, or both ways in combination; fit Board widths and lengths to roof framing, saving both waste and cutting as far as possible. Provide proper nailing base, as directed. Celotex insulation eliminates condensation. Lining the underside of roof rafters will supply additional insulation and sound-quieting. Provide ventilation at ridge, between roof and Celotex (when on underside of rafters) and with louvres.

**B6. PITCHED ROOFS.—CELOTEX UNDER SLATE, TILE OR RIGID SHINGLES:** Fix Celotex over rafters, as directed in B1 to B4 inclusive. Over Celotex Insulation along each rafter nail a 2 in. Celotex strip or a wood lath. Over this nail securely, and at right angles to rafters, 3 in. x 1 in. battens spaced to fit rigid roofing selected. This construction is recommended as it leaves a space between horizontal battens and Celotex for drainage in case of leakage or condensation. See B3 for making a watertight horizontal joint, also Drawing D17.

(Continued on next page)





DRAWING B6.

Celotex insulation replaces wood roof sheathing or sarking under rigid shingles, iron, slate and tile roofs. All roofs supported on battens require sarking to keep out dust, wind, and often driving rain. Wood sarking shrinks and is not always tight. Celotex fixed as directed is always tight, it also insulates against winter cold and summer heat. Always provide drainage with 2 in. Celotex strips or lath laid over Celotex along rafters before fixing roofing battens.

**B7. PITCHED ROOFS.—CELOTEX FOR BOTH ROOFING AND INSULATION:** When fixed as directed and kept well painted, Celotex provides both roofing and insulation. Specifications and directions for fixing sent on request. Small bungalows, week-end cottages, out-buildings and garages may be both roofed and insulated with Celotex to advantage.

**B8. PITCHED ROOFS.—ATTICS AND ROOFS OF EXISTING BUILDINGS:** When insulation and sound-quieting are required cut in Celotex between rafters or fix to the underside of roof rafters, as directed in B1 (Y) to B1 (Y3) inclusive and B1 (Z). Consult C4 Wood Floors, and D17 Interior Linings for additional instructions. See D17 particularly—why roofs, floors, walls and ceilings should be insulated and quieted and how attics that are now waste space, uncomfortable and unlivable, may easily be remodelled. See Drawing D17.

**B9. ROOF DECKS.—FLAT.—GENERAL DIRECTIONS APPLYING TO BOTH WOOD AND CONCRETE DECKS:** Celotex Roof Insulation Board size 47 in. x 22 in. is recommended, but Celotex Standard Building Board may be substituted provided individual Boards no larger than 12 sq. ft. in area are used. Celotex Roof Insulation may be had single-thick or laminated in 2, 3, 4 or more thicknesses. Fix Celotex Insulation as specified or required over the entire roof deck; with a single layer of Celotex, offset joints between Boards one way.

At all parapet walls, fire walls, pent houses, housings or other structures projecting above the roof deck, cut and fit Celotex Insulation properly. Bring edges of Boards into moderate contact with each other and roof projections, but do not force Celotex Insulation into place.

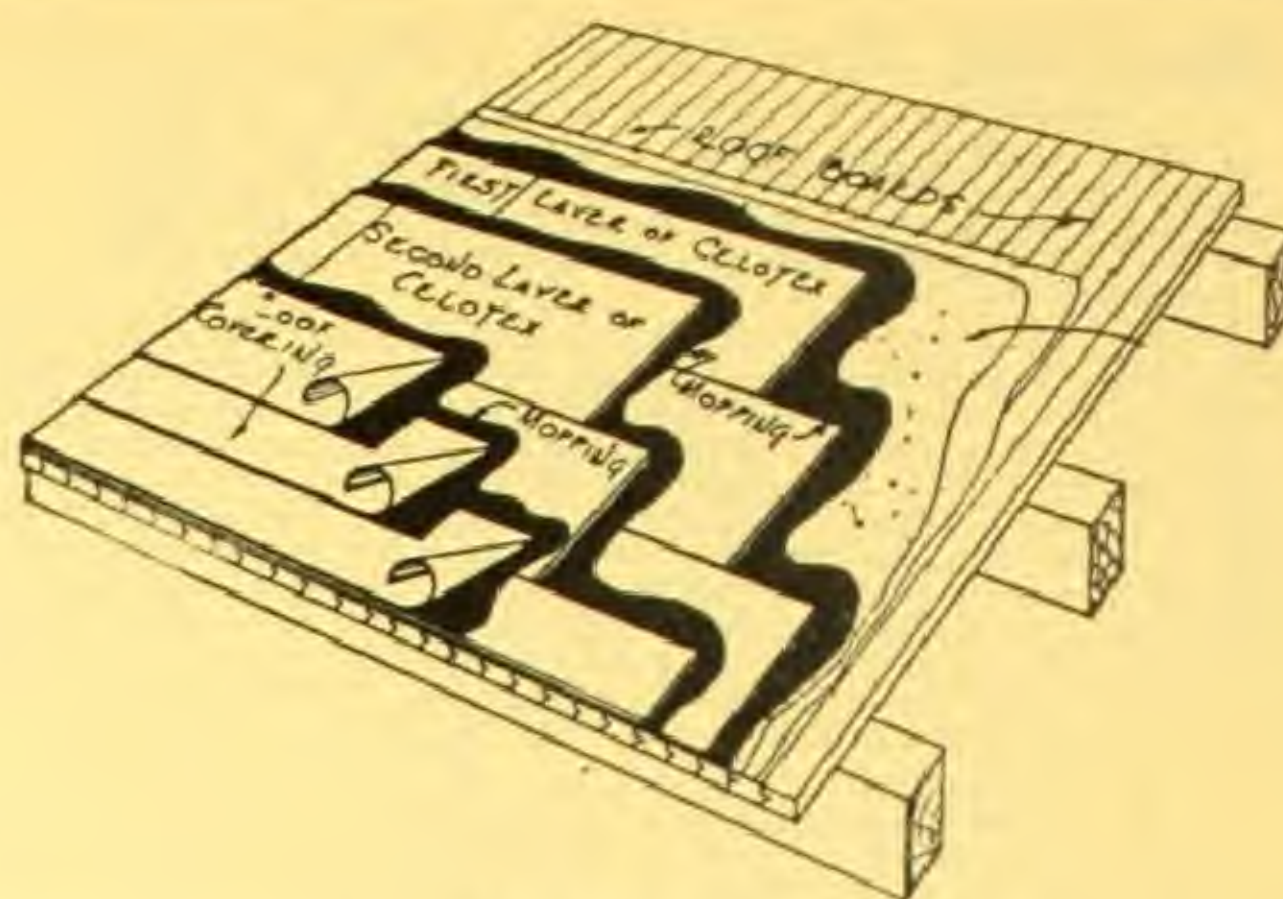
Lay only as much Celotex Insulation over the roof area as can be covered and protected by the roof covering in any one day. At the finish of each day's work protect temporarily any uncovered Celotex Insulation, particularly the edges, with an overlapping sheet of roofing; cut away or lift this temporary protection when the work proceeds.

**NOTE.**—Include in the roofer's contract the specifications for fixing roof insulation. Apply roofing selected over Celotex Insulation in accordance with the architect's, engineer's or manufacturer's specifications.

**B10. WOOD ROOF DECKS.—FLAT.—PREPARATION:** The surface of roof deck should be clean, thoroughly dry, free from avoidable projections, with all loose boarding properly nailed; adz or plane cupped or warped boards level; broom clear of all dirt and loose material just before fixing Celotex. A smooth roof deck is necessary as a base for Celotex Insulation.

**B11. WOOD ROOF DECKS.—FLAT.—CONDENSATION—HIGH HUMIDITIES:** To prevent condensation in textile mills, laundries, driers, dry kilns, canneries, or where high humidities are maintained, before fixing the required thickness of Celotex Insulation, cover the entire wood deck with one-ply roll-roofing, coated side placed down; tack on 4 in. centres throughout surface with at least a 2 in. lap at edges, seal lap with hot bitumen or pitch. Where humidity conditions are exceptionally severe, use two separate layers of one-ply roll-roofing, coated side placed down; tack first layer, as directed above, mop second layer into place with hot bitumen or pitch. Lap edges at least 2 in. and seal, lap parallel to and offset with preceding layer. A single waterproof layer of roofing is desirable over all wood roof decks before fixing Celotex, but is not necessary except under conditions mentioned above or when there is a possibility of bitumen or pitch drainage through the board joints of the wood decking.

**B12. WOOD ROOF DECKS.—FLAT.—FIXING CELOTEX INSULATION:** See B9 for size of Boards and general directions. Fix each Celotex Board in place by nailing through the centre and along all edges with 1½ in. galvanized clouts, 12 gauge, with ¾ in. heads, spaced 12 in. apart; stagger the course of nails through the centre of each Board. (200 clout nails required to fix each 100 sq. ft. of single-thick Celotex). Celotex Insulation may be mopped with hot bitumen instead of nailing, provided one layer of one-ply roll-roofing is first laid over the wood roof deck, as directed in B11; mop and fix Celotex over this surface, as directed in B15. When extreme humidity conditions make it advisable to increase the amount



DRAWING B11.

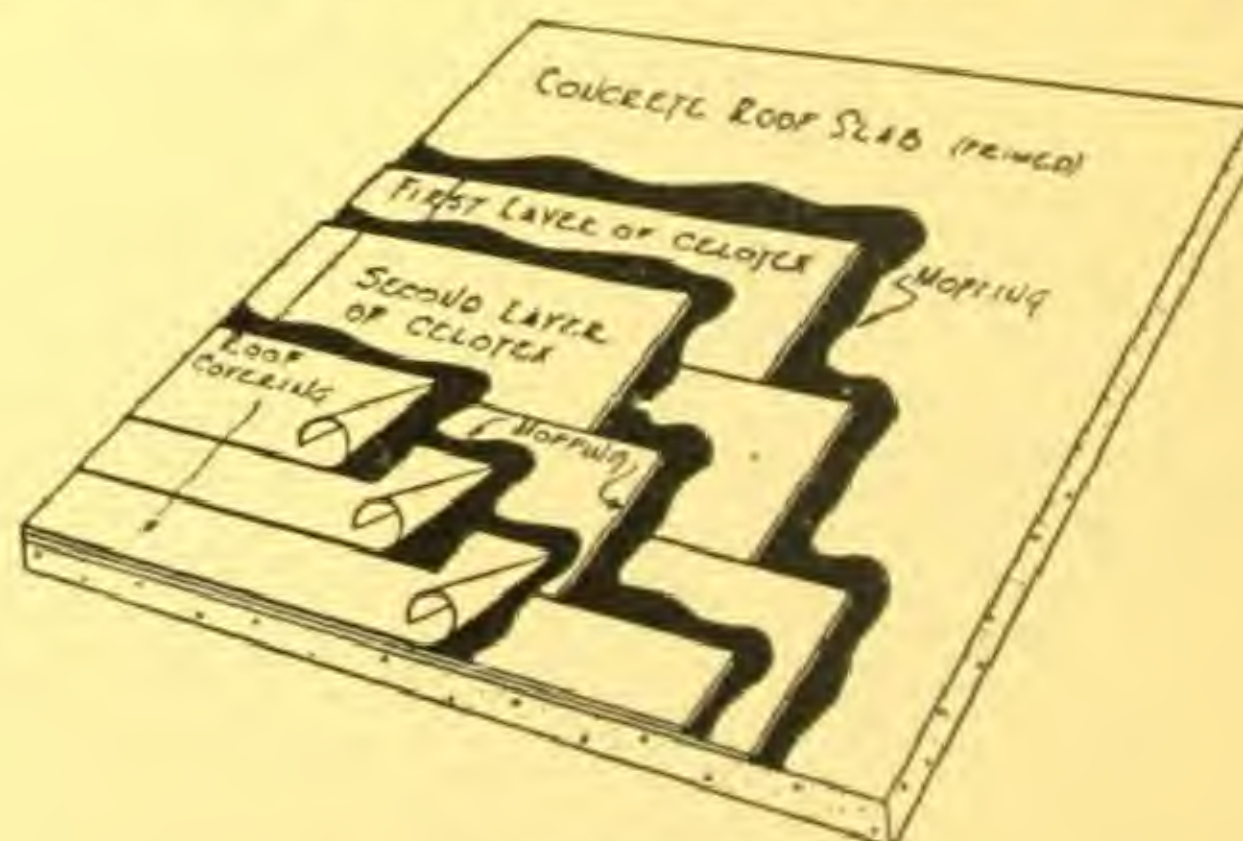
Details of fixing Celotex Insulation over flat wood roof deck for exceptionally high humidities. With multiple layers of Celotex nail through final layer with nails of sufficient length to fasten securely to wood deck.

of waterproofing (in addition to the roll-roofing, as directed in B11 and especially when two or more layers of Celotex Insulation are specified, mop the first layer with hot bitumen or pitch and nail to wood deck; successive layers of Celotex are then applied with joints of each layer offset both ways with the preceding layer and mopped into place one Board at a time with hot bitumen or pitch, either with or without nailing and as directed in B15 and B16.

**B13. WOOD ROOF DECKS.—FLAT.—MULTIPLE THICKNESSES OF CELOTEX:** When more than one thickness of Celotex is to be used as, for example, ½ in. and 1 in., fix the lesser thickness (½ in.) first and follow with the greater thickness (1 in.) on top and offset joints both ways with each preceding layer. Do all nailing through the surface of the final Board, using nails of sufficient length to penetrate the underlying wood deck at least one inch.

**B14. CONCRETE ROOF DECKS.—FLAT.—PREPARATION:** The roof deck should be dry, well cured, reasonably smooth, free from depressions and the surface of the roof deck cleared of all dirt and loose material just before fixing Celotex Insulation. Rough, uneven, or depressed surfaces will not provide a suitable base to receive Celotex Insulation; the finished surface of the concrete deck shall be subject to the approval of the architect or engineer and acceptable to the roofing contractor before the work of roof insulation is started. When hot bitumen is used, first give the concrete deck a coat of approved bituminous primer in accordance with the roofing manufacturer's specifications. If hot coal-tar pitch is used, a priming coat over a dry, well-cured concrete deck is not usually necessary.

**B15. CONCRETE ROOF DECKS.—FLAT.—FIXING CELOTEX INSULATION:** See B9 for size of Boards and General Directions. Fix each Celotex Board in place, one at a time, with hot bitumen or pitch mopped at a temperature maintained between 350 and 400 degrees Fahrenheit. Use not less than 30 lbs. to mop each 100 sq. ft. of Board fixed. Mop only sufficient area for fixing one Celotex Board at a time; place Celotex immediately into the hot bitumen or pitch. Complete adhesion to concrete deck is necessary; carefully press down Board edges into the mopping of hot bitumen or pitch. See that all edges of the Boards are completely coated.



DRAWING B15.

The contraction and expansion of flat concrete roof decks frequently causes serious trouble. Two layers of Celotex over a 4 in. concrete deck with usual roof covering will reduce this expansion approximately 60 per cent. Expansion cracks in roof slabs, expansion that pushes parapet walls out of plumb, and expansion that fractures the roof coverings may all be avoided by proper roof insulation with Celotex.

(Continued on next page.)



**B16. CONCRETE ROOF DECKS—FLAT—MULTIPLE THICKNESSES OF CELOTEX:** When more than one layer of Celotex Insulation is to be applied, coat the top surface of each layer with a uniform mopping of hot bitumen or pitch; thoroughly embed all Boards, one at a time, while mopping is hot. When more than one thickness of Celotex Insulation is to be used, for example,  $\frac{1}{2}$  in. and 1 in., fix the lesser thickness ( $\frac{1}{2}$  in.) first and follow with the greater thickness (1 in.) on top (and lay with joints offset both ways with respect to the joints of the preceding layer). Apply alternate layers parallel to each other; never lay in alternate layers with Board lengths at right angles or crosswise with each other.

**B17. IMPORTANT SUPPLEMENTARY DIRECTIONS—FLAT ROOFS:** In order to obtain the best results the following supplementary directions covering work to be done by contractors other than the roofer should be included in the architect's specifications.

(a) **SHEET METAL WORK:** Improper flashing construction constitutes a source of considerable roofing trouble. It is important that insulation be protected from the elements. The additional expense of roof insulation warrants using the very best material and labour for flashing construction.

At all exposed eaves it is important that metal eave strips be extended down over the edges of the roof boarding and securely fastened in place and provided with a drip that will expel all the drainage water.

All types of vents, outlets, drains, scuppers, and the like, should be properly flashed and installed in a substantial workmanlike manner.

Where large or heavy ventilators or standpipes or louvers are installed, they should be securely anchored to the underlying roof deck and should not depend for fastening upon the insulation.

(b) **CONCRETE WORK:** Where a roof deck is of concrete, it is important that the roof be uniformly graded and that the surface be finished smooth and level and free from depressions. The concrete should be dry before the insulation layer is applied. It is also suggested that a chamfered nailing block be embedded in the concrete deck along all wall lines in order to permit nailing of Celotex Insulation at these points.

(c) **ANGLE FILLETS:** Where angle fillets are provided along the wall line, the Celotex Insulation should first be installed over the roof deck surface and the angle fillets applied over the Celotex. This also applies on sawtooth curbs, and the like, where angle fillets are installed.

(d) **ROOFING WORK:** It is strongly recommended that on all jobs of roofing the work of fixing the Celotex for roof insulation be included in the roofing contract. This eliminates divided responsibility and gives the roofing contractor an incentive to complete the work in a satisfactory manner.

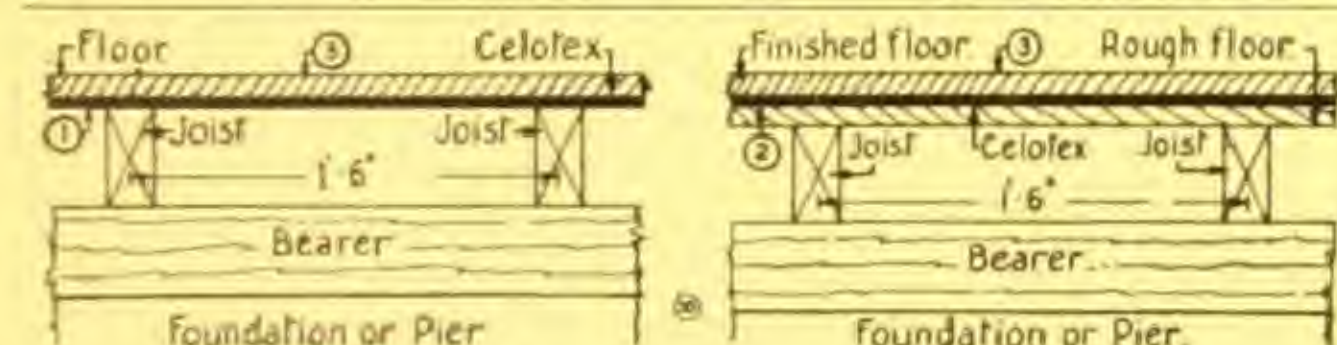
It is impossible to specify all details essential for the best work. The following directions, however, contribute to the satisfactory completion of roof insulation work.

When Celotex Roof Insulation is delivered to the job, it should be piled over flat even surfaces and properly protected from the weather. In applying layers of Celotex Roof Insulation the roofing workmen should exercise care not to jam or force the Board into place. Where moppings of hot bitumen or pitch are required, it is necessary that these materials be used at a temperature maintained at 350 to 400 degrees Fahrenheit, and that each Board unit be completely embedded while moppings are hot. The roofing contractor should refuse to accept a roof deck that is not in satisfactory condition to receive the insulation. Most timber now furnished for roof deck is green when delivered to the job. This means that if the roof sheathing or sarking is not very securely nailed in place it will shrink and warp and curl. This action frequently shows through the layers of insulation and the roof covering. It is important that care be exercised in properly nailing the wood roof deck and the Celotex Roof Insulation when fixed over green timber.

(e) **ROOF INSULATION SERVICE:** For the Architect and Engineer the following technical literature will be made available on request. Kindly name publication required.

SPECIFICATIONS AND DETAILS (404C).	DIVIDENDS FROM PROPER ROOF PROTECTION (419).
HEAT INSULATION DATA (410A).	HEAT TRANSMISSION COEFFICIENTS OF WALLS AND ROOFS (421).
CORRECTION OF ROOF CONDENSATION (411).	
RADIATION SAVING (413).	

Information covering special or individual insulating problems will be supplied on request. In this connection references will be based on authoritative Heat Insulation data, and authorities quoted.



DRAWING C2. READ (1), (2), (3). DRAWING C3. READ (1), (2), (3).

(1) Keep out dampness by coating under (or down) side of Celotex with hot bitumen (or glue size and oil paint) before fixing.

(2) When wood floors (ground floors without basements) are damp, tack waterproof roofing over rough floor or coat underside of Celotex, as directed in (1), before fixing Celotex.

(3) For additional insulation and quieting use Celotex as a floor lining under carpet or linoleum, as directed in C17 to C24 inclusive.

## SECTION C—FLOORS

### INSULATION (Heat and Cold)—SOUND-QUIETING—LINING (Under Carpet or Linoleum).

Celotex built into floors, or as a lining under floor coverings, provides insulation against heat, cold, dampness and wind. Properly placed, it also gives a high degree of sound-quieting. Again, as a lining under floor coverings, Celotex both insulates and quiets floors and prolongs the life of floor coverings. Except in one-storey buildings without basements, floor construction in the majority of cases also carries the ceiling, so that insulation and quieting of ceilings as well as floors should have attention in multi-storey construction.

**C1. WOOD FLOORS WITHOUT BASEMENTS.—INSULATION AND QUIETING:** When it is not possible or desirable in a new or existing building to fix Celotex to the underside of or between floor joists, adequate insulation may be secured by fixing Celotex over joists or between rough and finished floor, as directed in C2 and C3, or over floor under floor coverings, as directed in C18 to C21 inclusive.

**C2. WOOD FLOORS—INSULATING AND QUIETING—CELOTEX OVER JOISTS UNDER FLOORING:** Fix Celotex lengths, lengthwise of joists; provided joists are spaced regularly on 16 in., 18 in. or 24 in. centres, cut in headers (solid strutting or nogging) at Celotex Board ends to provide a firm nailing base. Nail to intermediate joists, headers or battens, then around all Board edges (both sides and ends) with  $\frac{1}{2}$  in. galvanized clout nails, 10 or 12 gauge,  $\frac{3}{4}$  in. heads (380 nails required to fix each 100 sq. ft. of Celotex floor surface). Space nails 6 in. apart over intermediate joists, headers or battens, 3 in. apart along edges and ends, and  $\frac{3}{4}$  in. away from all edges. Drive clout nail heads slightly below Celotex surface. Over hardwood framing use galvanized clout nails  $\frac{1}{2}$  in. long, as directed above. Use 2½ in. clouts for double-thick Celotex Board. Any Boards spaced less than 3/16th in. at joints or at ends of Boards should be cut open to 3/16th in. Protect from damage during fixing. Celotex does not provide a working platform. When joists are not spaced regularly (as is often found in old construction) lay Celotex lengths across joists and cut in headers between joists to provide a firm nailing base for Board edges. (Boards 4 ft. wide will be found most economical for this purpose.) Use Celotex in lengths so that Board ends meet over joists; if necessary, cut to length required. See Drawing C2 (foot of column 1, this page).

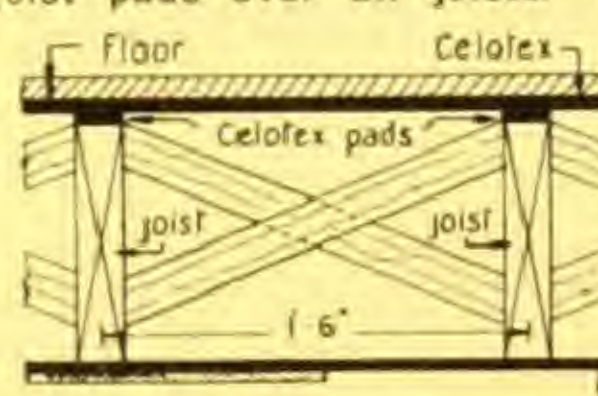
**C3. WOOD FLOORS—INSULATING AND QUIETING—CELOTEX BETWEEN ROUGH AND FINISHED FLOORING:** Level surface of rough floor, especially at board joints, and prepare as directed in C19. Either coat underside of Celotex with hot bitumen (or size and oil paint) or cover rough flooring with roll-roofing, coated side down, before clout nailing Celotex to rough floor. Only nail sufficiently to hold in place while the finished floor is being fixed. Lay Celotex Boards to moderate contact; do not crowd Celotex into place. Lay finished floor over Celotex, nailing through to rough floor. See Drawing C3.

**C4. WOOD FLOORS—ATTICS—INSULATION AND QUIETING:** Fix Celotex over existing attic floor (or ceiling) joists, as directed in C2. If attic floor is to be used for storage or as a walk-over surface, cover Celotex with wood flooring. If attic is already floored, fix Celotex over existing flooring, as directed in C19. If attic is to be occupied, cover Celotex with linoleum or carpet, as directed in C18 to C21.

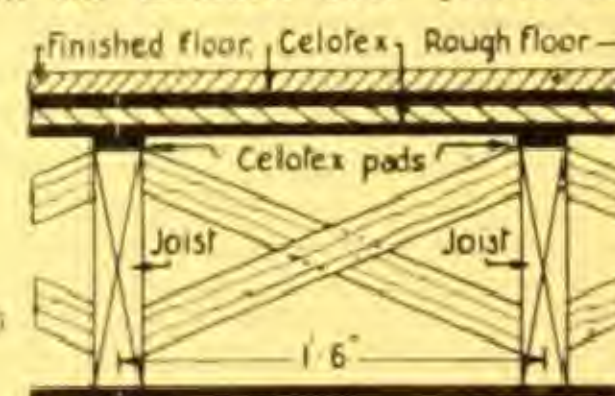
Give particular attention to fixing Celotex with a tight joint where floor insulation meets side walls and roof rafters, also the space between ceiling joists; fix Celotex so as to block off and prevent hot or cold air leakage into attic. Stopping air leakage is important. Consult B8 (Pitched Roofs) and D17 (Interior Linings) for additional instructions. See D17, particularly, why roofs, floors, walls and ceilings should be insulated and quieted and how attics that are now waste space, uncomfortable and unlivable, may easily be remodelled.

**C5. WOOD FLOORS—INSULATING AND QUIETING:** Directions under Drawings C2 to C11 inclusive are intended for suggestions; any portion of two or more drawings may be combined for the floor and/or ceiling desired. In a general way the number of layers of Celotex controls the degree of insulation and quieting secured, but weight, rigidity, complete discontinuity of materials (viz., separating the floor surface from the floor structure with sound-absorbing Celotex) and freedom from vibration of the floor and ceiling structure itself—all these factors must have due consideration. For sound carried by materials of construction, as distinguished from sound carried by air, Celotex in floors, walls and ceilings, provides varying degrees of quieting depending upon how used, where used, and thickness used.

**C6. WOOD FLOORS—INSULATING AND QUIETING:** Celotex joist pads for quieting are worth while, but without additional quieting, too much must not be expected. Joist pads 2 in. wide may be cut from any Celotex available. Fix Celotex joist pads over all joists. Then fix Celotex over joists and



Celotex as a base for plaster  
DRAWING C6.



Celotex as a base for plaster  
DRAWING C7.

(Continued on next page)

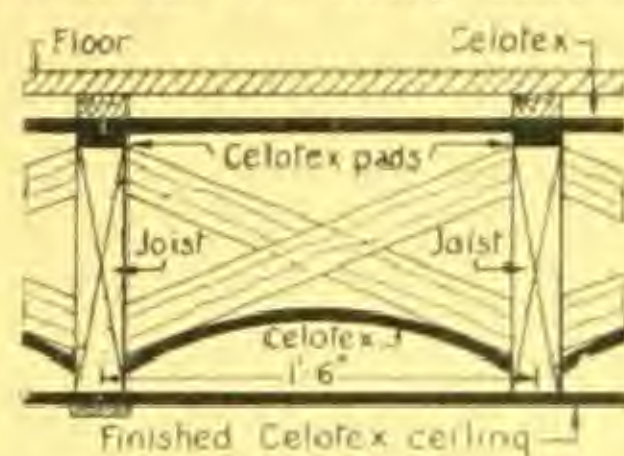


headers, and wood floors over Celotex, as directed in C2. For framing and fixing a Celotex ceiling, to be left in its natural colour or plastered, see Section D. For decorating ceiling, see Section E.

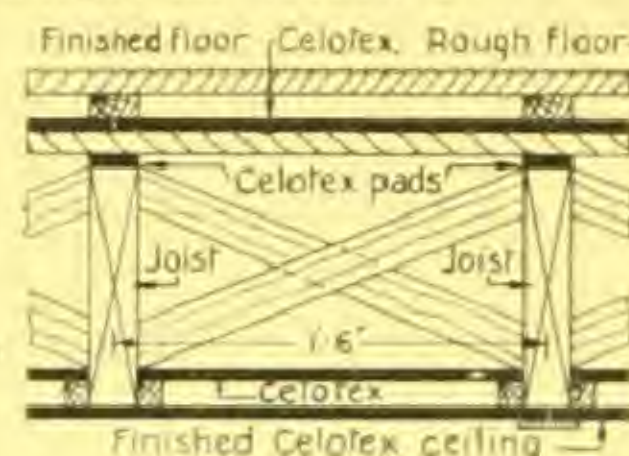
**C7. WOOD FLOORS—INSULATING AND QUIETING:** Fix Celotex joist pads, then nail a layer of Celotex over joists, as directed in C2, and lay rough flooring. Fix second layer of Celotex over rough flooring with only enough nailing to hold Board in place while the finished floor is being fixed. Either the Celotex joist pad, or the layer of Celotex over joists, or both, may be omitted. Two or more layers of Celotex provide greater insulation and quieting. For a ceiling of Celotex Lath or Celotex used as a base for plaster, see D21 to D23 inclusive.

**C8. WOOD FLOORS—INSULATING AND QUIETING:** Fix Celotex joist pads, then nail a layer of Celotex over joists, as directed in C2. Lay 3 in. x 1 in. battens over Celotex lengthwise of joists and nail through to joist; then lay and nail finished wood floor to battens, cut bridging between joists short enough to allow Celotex to be sprung in between joists. Arch in a layer of Celotex, lapping ends of Board 4 in. and toe-nailing securely along edges. For a ceiling of Celotex in its natural colour, or decorated, see Section D.

**C9. WOOD FLOORS—INSULATING AND QUIETING:** Fix Celotex joist pads; lay rough flooring; fix Celotex over rough flooring, as directed in C3. Nail 3 in. x 1 in. battens over Celotex lengthwise of joists and nail finished floor to battens. Cut Celotex to fit snugly between joists and support in place with 1 in. x 1 in. fillets. Nail Celotex securely to fillets before nailing fillets to joists. Arching in a layer of Celotex, as described in C8, will be easier and cheaper than supporting on fillets. For fixing Celotex ceilings, see Section D.



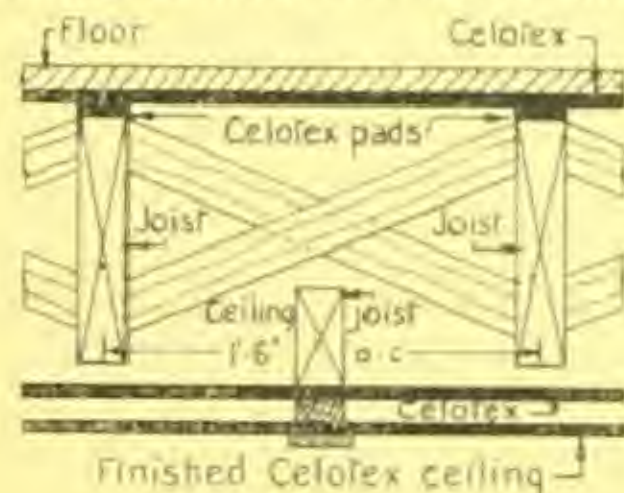
DRAWING C8



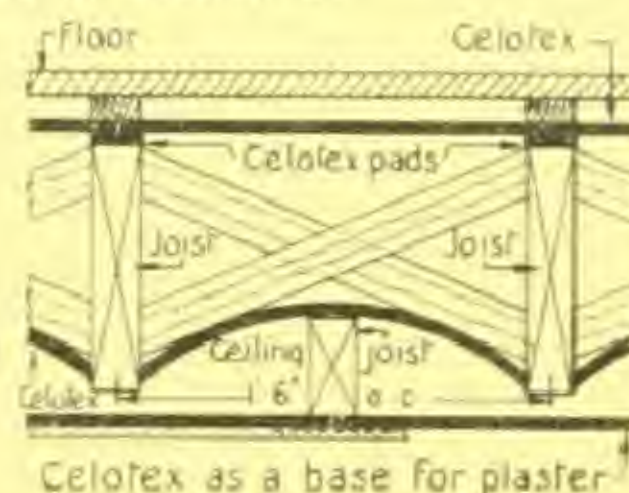
DRAWING C9

**C10. WOOD FLOORS—INSULATING AND QUIETING:** Fix Celotex joist pads and then fix Celotex and wood flooring, as directed in C2. Note that independent ceiling joists separate the ceiling entirely from the floor framing. Be careful to keep floor and ceiling construction from touching each other over the entire area. To construct a Celotex ceiling of two thicknesses, fix the first layer to the ceiling joists, then fix second layer to battens spaced and fixed for the Celotex ceiling desired, and as instructed in Section D.

**C11. WOOD FLOORS—INSULATING AND QUIETING:** Fix Celotex joist pads; Celotex; 3 in. x 1 in. battens; lay floor; cut bridging short so as to allow arching in a layer of Celotex under bridging, as directed in C8. Fix independent ceiling joists, entirely separated from floor joists; select the Celotex ceiling desired and fix as directed in Section D.

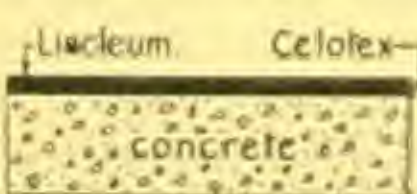


DRAWING C10

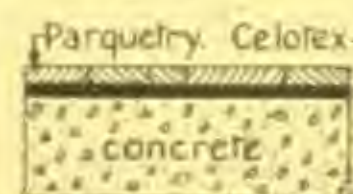


DRAWING C11

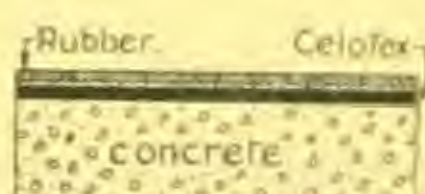
**C12. CONCRETE FLOORS—INSULATING AND QUIETING:** Because concrete offers little resistance to the passage of heat, cold, dampness or sound, concrete floors require adequate insulation and quieting. Underfoot they are very hard, and being without any resilience, are very tiring to work over. They require a cushioning material for comfort. Celotex insulates, quiets and cushions concrete floors better than any known material. Damp concrete floors, particularly in basements or floors laid in direct contact with the ground, should be well drained; concrete for new floors should be waterproofed with an integral waterproofing before pouring. In addition, before laying Celotex over green concrete or damp floors, they should be given a thorough coat of an approved bitumastic primer. When insulation (as well as sound quieting) is important, an extra heavy coat of hot bitumen over the floor is recommended before fixing Celotex.



DRAWING C13



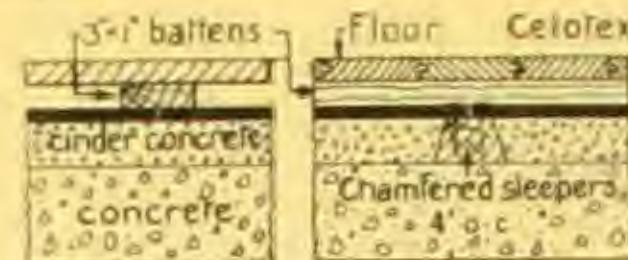
DRAWING C14 (a)



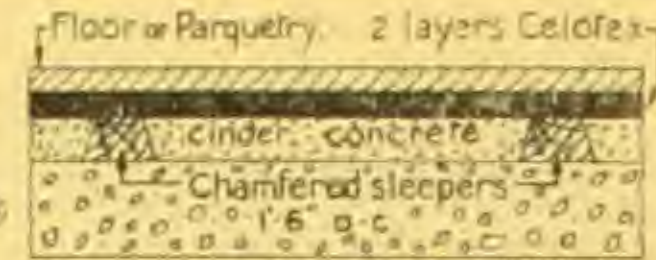
DRAWING C14 (b)

**C13. CONCRETE FLOORS—INSULATING AND QUIETING:** Celotex lining under carpets, rugs, linoleum or rubber floor coverings: Prepare floor as directed in C22. Fix Celotex and lay carpet or linoleum as directed in C23 and C24 respectively. While either 1 in. or 1/2 in. Celotex may be used, the thicker Board provides the greater insulation and quieting.

**C14. CONCRETE FLOORS—INSULATING AND QUIETING:** Celotex under (a) wood parquet or (b) rubber tile: Prepare floor and fix Celotex as directed in C22 and C24 respectively. Over Celotex, cement the flooring selected, according to the architect's, engineer's or manufacturer's specifications.



DRAWING C15



DRAWING C16

**C15. CONCRETE FLOORS—UNDER WOOD FLOORING—INSULATING AND QUIETING:** Lay 3 in. x 2 in. chamfered sleepers on 48 in. centres over concrete floor, fill in between with cinder concrete (coke breeze). Bring sleepers and cinder concrete to a level surface. Allow cinder concrete to dry out thoroughly. Lay 4 ft. wide Celotex, lengthwise of sleepers and nail edges, using clout nails spaced 6 in. apart. Over the Celotex fix 3 in. x 1 in. battens on 18 in. centres at right angles to and nailed through to sleepers. Nail finished floor to battens in the usual way. Over damp floors, protect Celotex as directed in C12.

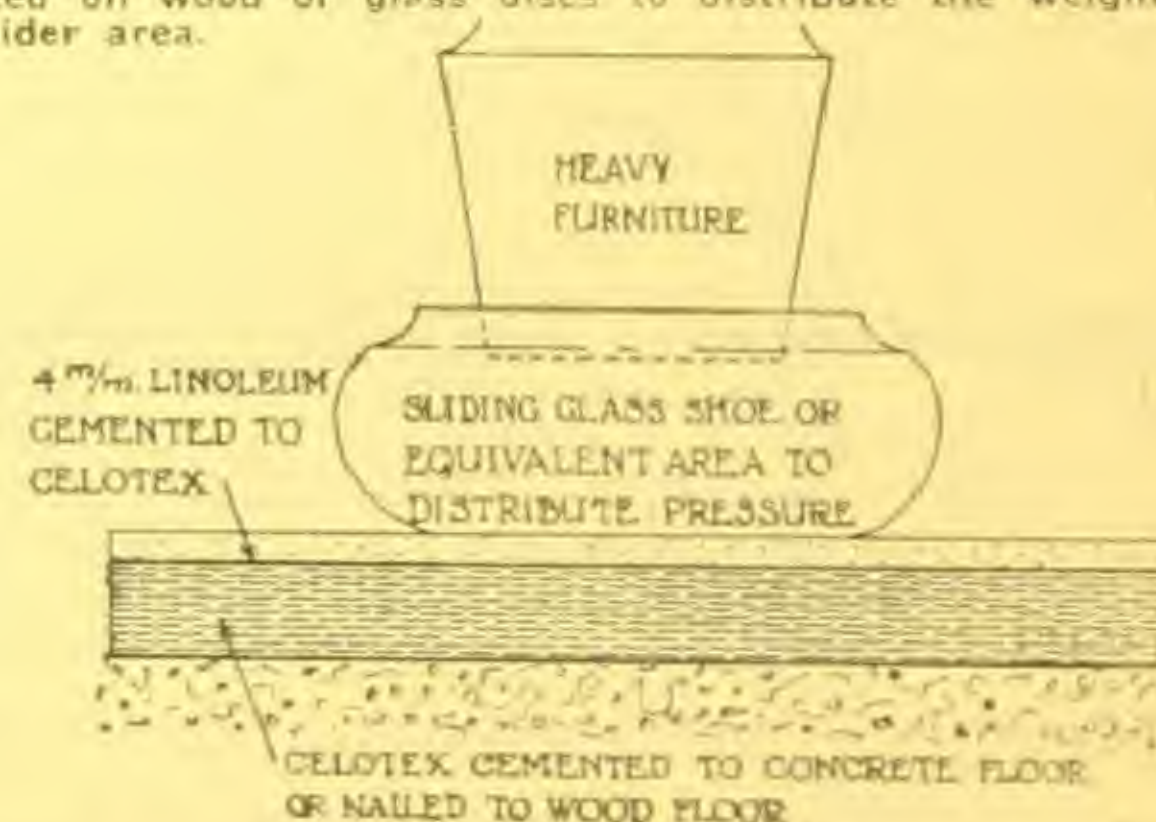
**C16. CONCRETE FLOORS—INSULATING AND QUIETING:** An alternate method, suitable more particularly to existing concrete floors: Lay 3 in. x 2 in. chamfered sleepers on 18 in. centres and fasten over concrete floor by drilling and plugging on 48 in. centres, or give concrete floor a heavy coat of hot bitumen, for a bond, and fill in between chamfered sleepers with cinder concrete. Bring sleepers and cinder concrete to a level surface. Allow cinder concrete to dry out thoroughly. Then nail 3 ft. wide Celotex lengthwise to sleepers, sufficiently to hold in place while nailing finished wood floor, over Celotex, through to sleepers. For heavy quieting, two layers of Celotex may be used; offset joints with joints of first layer as far as possible. Double-thick Celotex may also be used.

**C17. LINING FLOORS—CARPET AND LINOLEUM OVER CELOTEX (1/2 in. and 1 in. thick):** Over new or existing wood or concrete floors, a Celotex lining is the most effective way of quieting sound (impact of footsteps and other noise is usually communicated by floors). The resilient Celotex lining prevents disturbing sounds from being carried through or along the floor structure to other parts of the building. A Celotex floor lining also insulates against heat and cold, keeping out dampness, wind, dust, etc. It is always restful and resilient underfoot.

A Celotex lining definitely prolongs the life of carpets and rugs by eliminating friction between carpet and floor. Likewise under linoleum it effectively "blankets" minor floor irregularities, prevents "cupped" floor boards showing through the floor covering, and eliminates wear over board joints that crack and often break the linoleum surface. Without a Celotex lining, wood floor boards are always clearly outlined through light-weight carpets and linoleum after a few weeks' wear. Celotex as a lining may be applied over rough or finished wood floors; IN NEW CONSTRUCTION IT ELIMINATES THE COST OF FINISHED FLOORING. Over concrete floors a float finish only is necessary, SAVING THE EXPENSE OF A HAND-TROWELLED FINISH.

A Celotex floor lining is not too soft or too hard; it has just the right degree of cushioning. Its resilience underfoot is lasting. It is odorless, moth-proof and sanitary. It cannot mat down, bunch, creep or "drag" underfoot, or wear out carpets by friction, like soft linings.

**C18. LINING FLOORS—GENERAL INSTRUCTIONS:** Any level flooring material that will carry the required floor load is all that is needed as a base for a Celotex lining. All floors should be clean, thoroughly dry, level, free from avoidable projections and well broomed just before laying Celotex. Fix Celotex linings, each Board no larger than 18 sq. ft. Cut and fix Celotex carefully; use a sharp linoleum knife (do not break, tear or hack). When fitting Celotex, work from the sides to centre of floor to avoid waste and unnecessary cutting. Lay Celotex floor linings with all Board joints in moderate contact. Do not permit Boards to overlap and do not force Celotex into place. Level any unevenness at Celotex Board joints by sanding before laying floor coverings. Sufficient clearance under doors swinging over a Celotex-lined floor should be provided in plans and specifications; in existing buildings by planing off bottom of doors when necessary. When door clearance over existing floors will not accommodate 1/2 in., use 1 in. Celotex lining. Heavy pieces of furniture, especially pianos, bookcases, settees, kitchen furniture, etc., should be supported on wood or glass discs to distribute the weight over a wider area.



DRAWING C18

Discs of glass, wood or metal, under heavy furniture, distribute the weight over a larger surface; always use over carpet or linoleum when laid over Celotex. This protection prolongs the wear of floor coverings. Linoleums over Celotex should not be less than 1/11th in. or three millimetres thick.

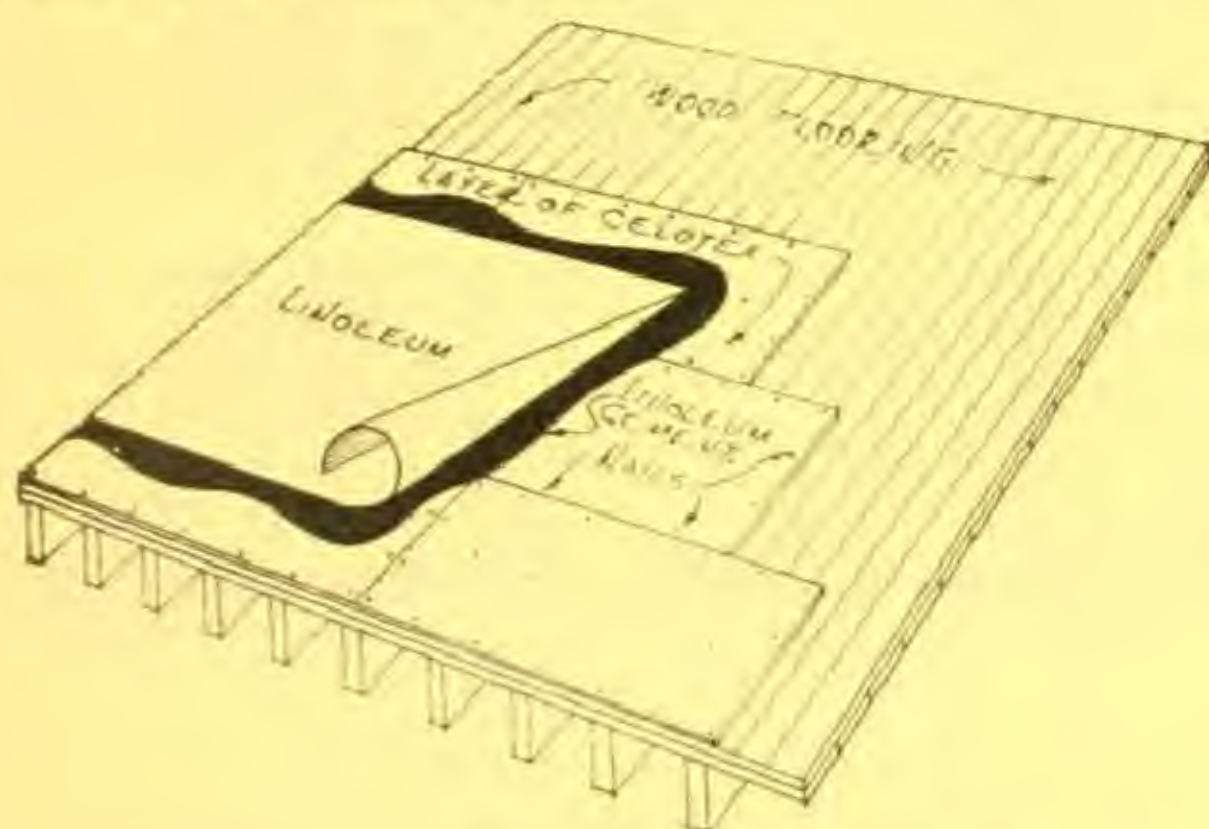
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**C19. LINING WOOD FLOORS—PREPARATION FOR CELOTEX LININGS—OVER OLD AND NEW FLOORS: ROUGH OR FINISHED FLOORING—SOFTWOOD OR HARDWOOD—(ALSO SEE C18).**—Rough flooring should be of well-seasoned wood, with boards of uniform thickness. Clamp boards tight when laying. In old floors replace weak or badly worn flooring. Renail loose boards. Sand or plane uneven or cupped boards to a level surface. Plug securely or cover knot holes with tin. Patch or fill wide or splintered cracks. A level floor surface is necessary as a base for a Celotex Lining.

**C20. LINING WOOD FLOORS—FIXING CELOTEX LINING AND LAYING CARPET:** Select the thickness of Celotex lining desired,  $\frac{1}{2}$  in. or  $\frac{3}{4}$  in. For fastening carpets, a 3 in. wood nailing strip is desirable, either  $\frac{1}{2}$  in. or  $\frac{3}{4}$  in. thick, depending on thickness of Celotex lining selected. Fit carefully, beginning at nailing strip. Fix Celotex into moderate contact with nailing strip; if wood nailing strip has not been provided, fix Celotex  $\frac{1}{2}$  in. away from all skirtings. When nailing Celotex into place, begin by staggering nails 12 in. apart through centre and then 6 in. apart along all Board edges; for  $\frac{1}{2}$  in. Celotex use 1 in. galvanized clouts, for  $\frac{3}{4}$  in. thickness use  $\frac{3}{4}$  in. galvanized clouts. Lay carpet over Celotex, stretching and tacking in the usual manner. If 3 in. wood nailing strip has not been provided, double-under edge of carpet along the  $\frac{1}{2}$  in. space between Celotex and skirting and tack directly to wood floor. Whenever necessary to tack carpet through Celotex linings, use tacks long enough to anchor carpet securely to wood floor. Half-inch Celotex Carpet Lining is strongly recommended; it is manufactured especially for use under carpets.

**C21. LINING WOOD FLOORS—FIXING CELOTEX LINING AND LAYING LINOLEUM:** Use  $\frac{7}{16}$ th in. Celotex Standard Building Board, each Board no larger than 18 sq. ft.; or  $\frac{1}{2}$  in. Celotex Lining, size 5 ft. x 3 ft. DO NOT USE  $\frac{3}{4}$  in. CELOTEX CARPET LINING UNDER LINOLEUM. Fit carefully, beginning at skirtings. Nail desired thickness of Celotex to wood floor, as directed in C20 for carpets. When Celotex is used under linoleum it is preferable to cement Celotex to wood floor with hot bitumen or any approved linoleum cement or paste that will bond with the wood floor. Linoleum used over Celotex should not be less than  $\frac{1}{16}$ th in. or three millimetres thick. Fix lengths of linoleum at right angles to the long edges of Celotex linings, as far as possible. Cut and fit linoleum carefully, avoiding small pieces which increase the number of joints or seams. After fitting, let linoleum lie in place without fixing for at least three weeks; longer if possible. Use any approved linoleum cement or paste for fixing to Celotex, and cement solid over entire area, then roll thoroughly with weighted roller. (Cementing at seams or joints only will not make a satisfactory job.) Use at least one gallon cement (English liquid measure) for each 112 $\frac{1}{2}$  sq. ft. (12 $\frac{1}{2}$  sq. yds.) of area. Linoleum may be fastened by tacking (through Celotex) to wood floor, but tacking is not recommended.



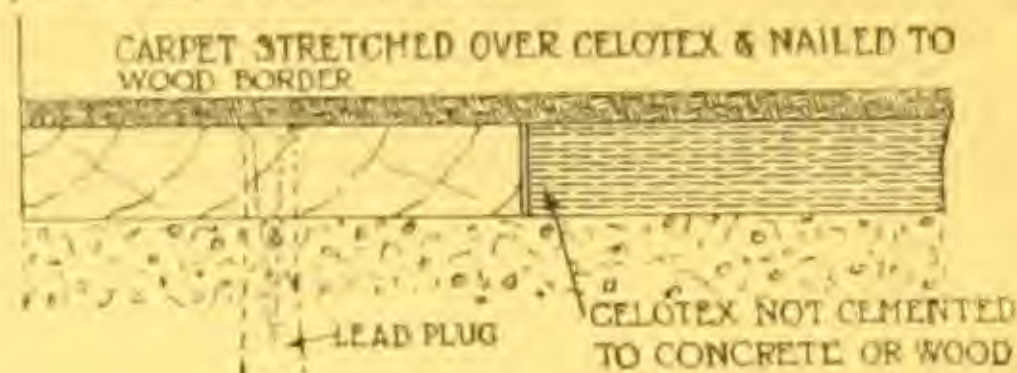
DRAWING C21.

Celotex as a floor lining prevents outline of wood flooring showing through linoleum. The life of carpets or linoleum is increased over a Celotex lining. It also insulates and quiets either wood or concrete floors.

**C22. LINING CONCRETE FLOORS—PREPARATION FOR CELOTEX LINING—OVER NEW OR OLD FLOORS—HAND-TROWELLED OR FLOAT FINISH (ALSO SEE C18):** A level float finish only is required. Floor should be thoroughly dry, reasonably clean and free from knurls, depressions or avoidable projections. Damp or uncured concrete floors should be dried as thoroughly as possible, then given a heavy coat of an approved bituminous primer before fixing Celotex. Broom thoroughly just before laying or cementing Celotex to floor.

**C23. LINING CONCRETE FLOORS—FIXING CELOTEX LINING AND LAYING CARPET:** Select the thickness of Celotex lining desired,  $\frac{1}{2}$  in. or  $\frac{3}{4}$  in. For fastening carpets, a 3 in. wood nailing strip is necessary, fixed securely along skirtings on four sides of the room. This nailing strip may be fixed: (1) in the float finish at floor level, or (2) in float finish projecting  $\frac{1}{2}$  in. or  $\frac{3}{4}$  in. above floor level (depending on thickness of Celotex selected), or (3) attached to floor by drilling and plugging. This 3 in. nailing strip may also be fixed by attaching to skirting or walls with galvanized metal straps, especially in old construction. Lay Celotex in moderate contact with nailing strips that project above floor level. If nailing strips are level with floor lay Celotex  $\frac{1}{2}$  in. away from all skirtings. Fit Celotex carefully, beginning at nailing strip or  $\frac{1}{2}$  in. from skirting, or at skirtings, as the job may require, and work toward centre of floor to avoid waste and unnecessary cutting. It is not necessary to cement Celotex linings under carpets to concrete floors in small or medium-sized

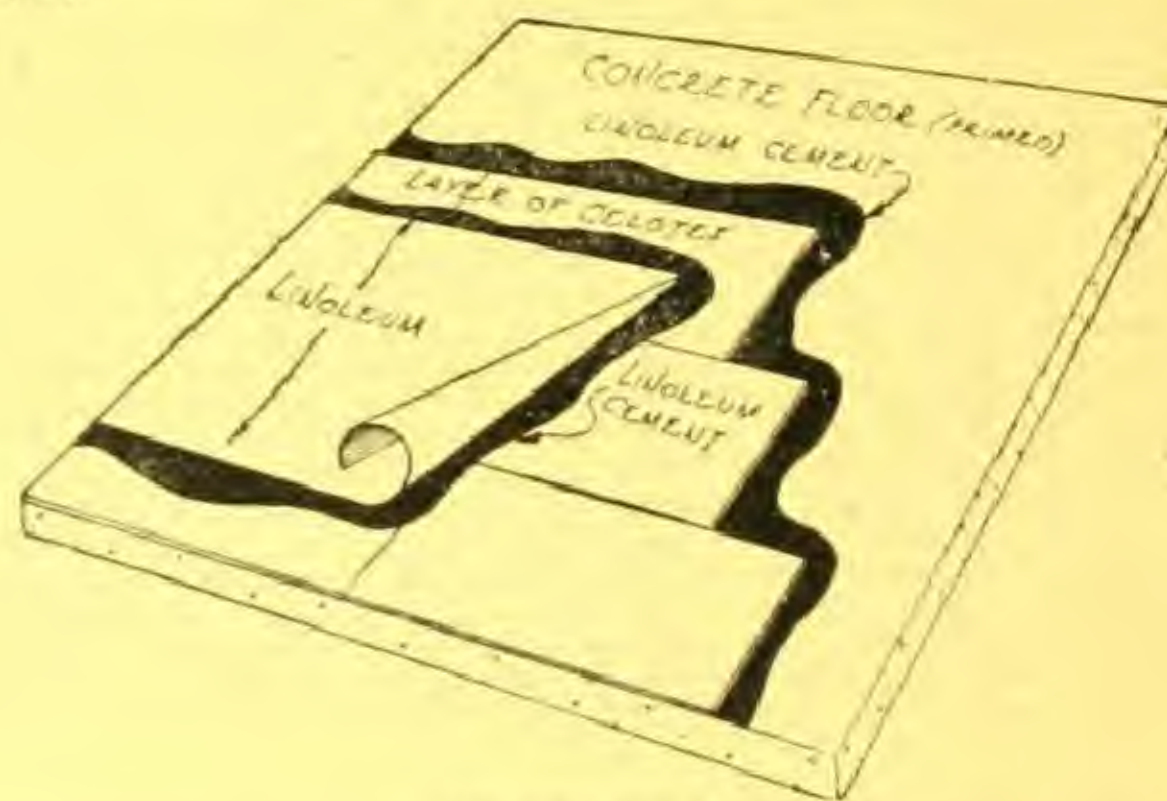
rooms. In large rooms, halls, hotel lobbies, public buildings, theatre and church aisles, cement lining to concrete floor, as directed for cementing in C24. Lay carpet over Celotex, stretching and tacking in the usual manner. If the 3 in. nailing strip is at floor level, turn-under edge of carpet along  $\frac{1}{2}$  in. space between Celotex and skirting, and tack. Whenever necessary to tack carpet through Celotex lining, use tacks long enough to anchor securely to wood nailing strip. Half-inch Celotex Carpet Lining is strongly recommended; it is manufactured especially for use under carpets.



DRAWING C23.

For fastening carpets this 3 in. wood nailing strip should be securely fixed over wood or concrete floors along skirtings on four sides of room. In small and medium-sized rooms it is not necessary to bond Celotex to concrete floors under carpet.

**C24. LINING CONCRETE FLOORS—FIXING CELOTEX LINING AND LAYING LINOLEUM:** Use  $\frac{7}{16}$ th in. Celotex Standard Building Board, each Board no larger than 18 sq. ft.; or  $\frac{1}{2}$  in. Celotex Lining, size 5 ft. x 3 ft. DO NOT USE  $\frac{3}{4}$  in. CELOTEX CARPET LINING UNDER LINOLEUM. Give damp or uncured concrete floors a heavy coat of an approved bituminous primer before fixing Celotex. Fit Celotex carefully, beginning at skirtings. Fix Celotex by mopping each Board into place with hot bitumen maintained at 350 to 400 degrees Fahrenheit, using not less than 30 lbs. per 100 sq. ft. Mop area for each Board, one at a time, and lay immediately in the hot bitumen; complete adhesion to concrete floor is necessary. Roll thoroughly with weighted roller. Instead of hot bitumen, any elastic waterproof cement THAT WILL ADHERE TO CONCRETE may be used. Linoleum used over a Celotex lining should not be less than  $\frac{1}{16}$ th in. or three millimetres thick. Fix lengths of linoleum at right angles to the long edges of Celotex linings, as far as possible. Cut and fit linoleum carefully avoiding small pieces which increase the number of joints or seams. After fitting, let linoleum lie in place, without fixing, for at least three weeks, longer if possible. Use any approved linoleum cement or paste for fixing linoleum to Celotex, and cement solid over entire area, then roll thoroughly with weighted roller. (Cementing at seams or joints only will not make a satisfactory job.) Use at least one gallon cement (English liquid measure) to each 112 $\frac{1}{2}$  sq. ft. (12 $\frac{1}{2}$  sq. yds.) of area.



DRAWING C24.

Celotex between linoleum and concrete for insulating floors against cold and dampness, also for quieting noise. As a floor lining Celotex is resilient and restful undertoot, particularly over concrete floors. As a floor lining over wood or concrete, Celotex prolongs the life of floor coverings.

## SECTION D—INTERIOR LININGS

How walls and ceilings, from cellar to attic, are lined with Celotex for insulation, sound-quieting, and for a beautiful wall or ceiling surface, either without or with further decorative treatment.

**D1. INTERIOR LININGS—FRAMING WALLS:** Space studs on 12 in., 16 in. or 18 in. centres for substantial construction; studs for non-load-bearing partitions and for less substantial construction may be spaced on 24 in. centres.

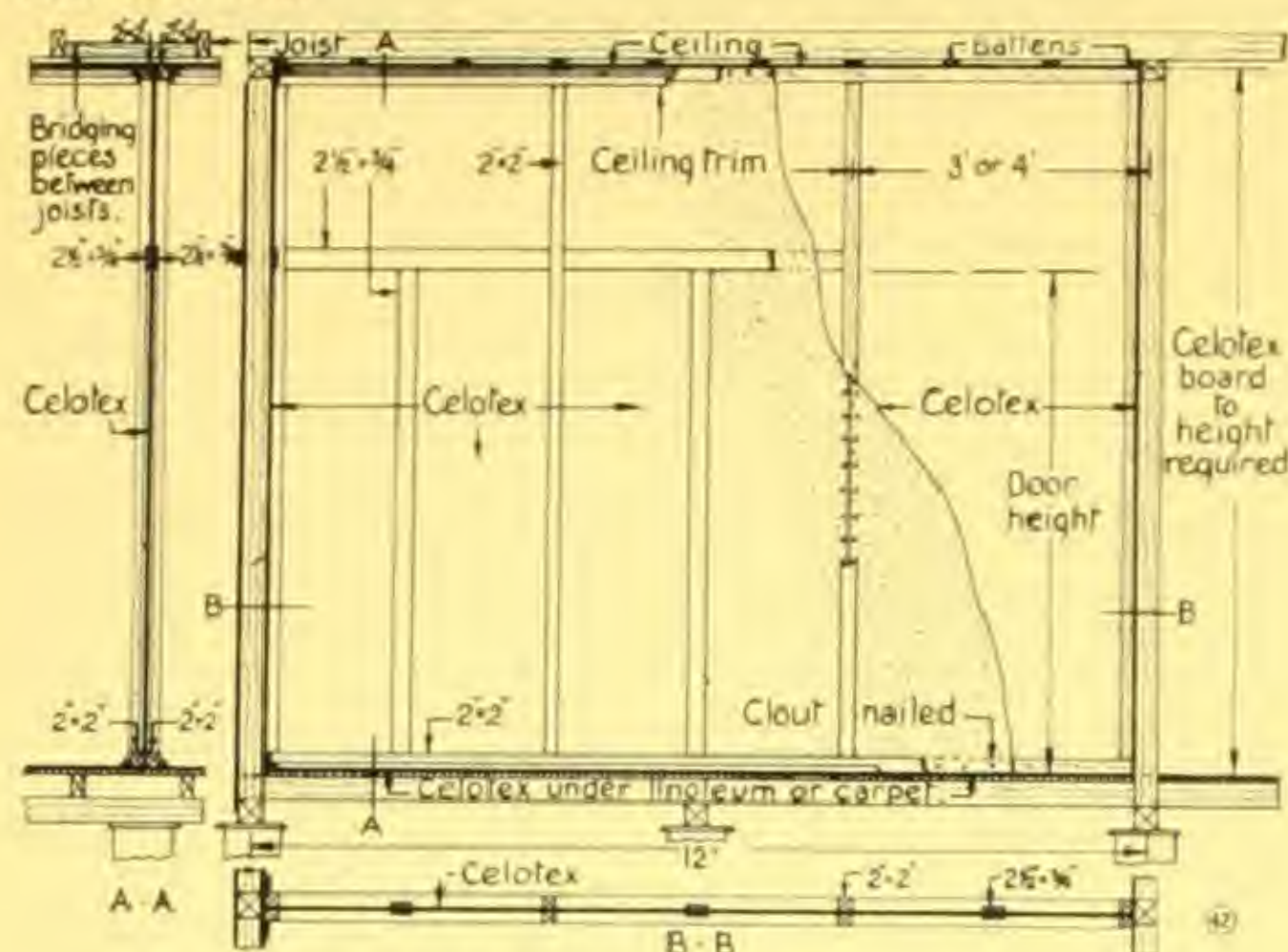
**D2. INTERIOR LININGS—FRAMING CEILINGS:** Never space joists or battens on more than 18 in. centres. For ceilings, cut in headers (solid strutting or nogging) between joists or battens every 4 ft.; additional headers are also required to provide a firm nailing base, as directed in D3.

**D3. INTERIOR LININGS—FRAMING WALLS AND CEILINGS:** All Celotex Board edges (both ends and sides) must have a firm nailing base; cut in headers between studs, joists, rafters or battens where necessary; also under chair rails, plate rails, picture rails, heavy mouldings, beams or panelling. When joists, studs or rafters are spaced irregularly, or on more than 18 in. centres, or do not present a true surface,

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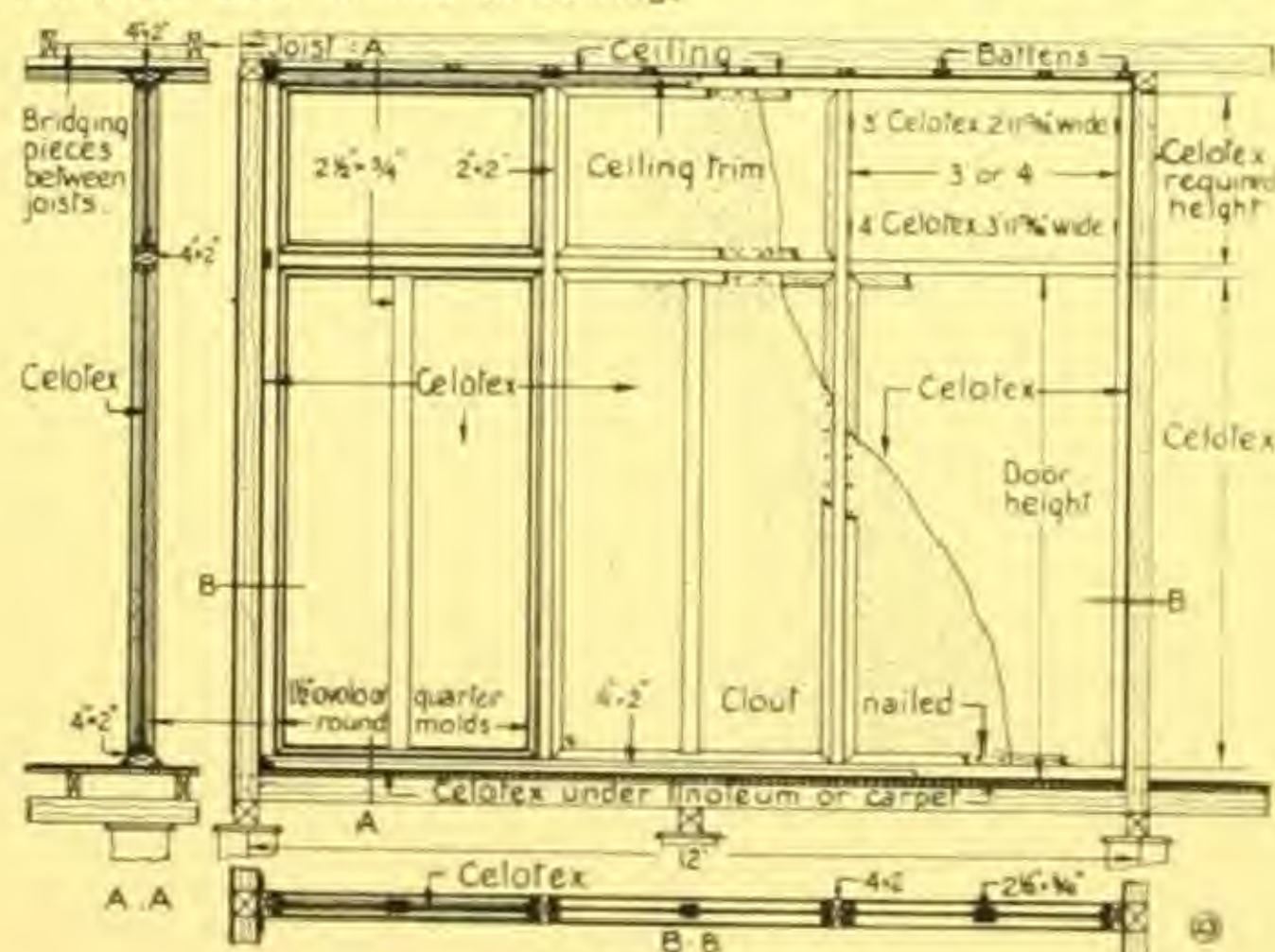
cover at right angles and bring to a level surface with 3 in. x 1 in. battens, spaced on not more than 18 in. centres. Studs and joists should be framed to conform to the design of Board spacing or panelling required; along all Board edges (both ends and sides) use extra studs, joists, battens and/or headers where necessary to provide a firm nailing base. Linings need a true, even, substantial framing surface for satisfactory results. Use only straight framing timber of uniform thickness. The superior results justify care in the selection of straight seasoned timber. Ordinary framing of studs, joists, rafters, headers and battens are illustrated in Drawings A3, A10, A11, A13.



DRAWING D4 (a).

Walls with a single thickness of Celotex, either 3 ft. or 4 ft. wide, are economical and practical. See Drawing D4 (b) for details at floor, rail and head. At head use headers or bridging pieces deep enough to rest on existing ceiling unless headers are placed directly over ceiling battens. Panels in this wall may be framed with small moulding if desired. The Celotex floor lining is optional.

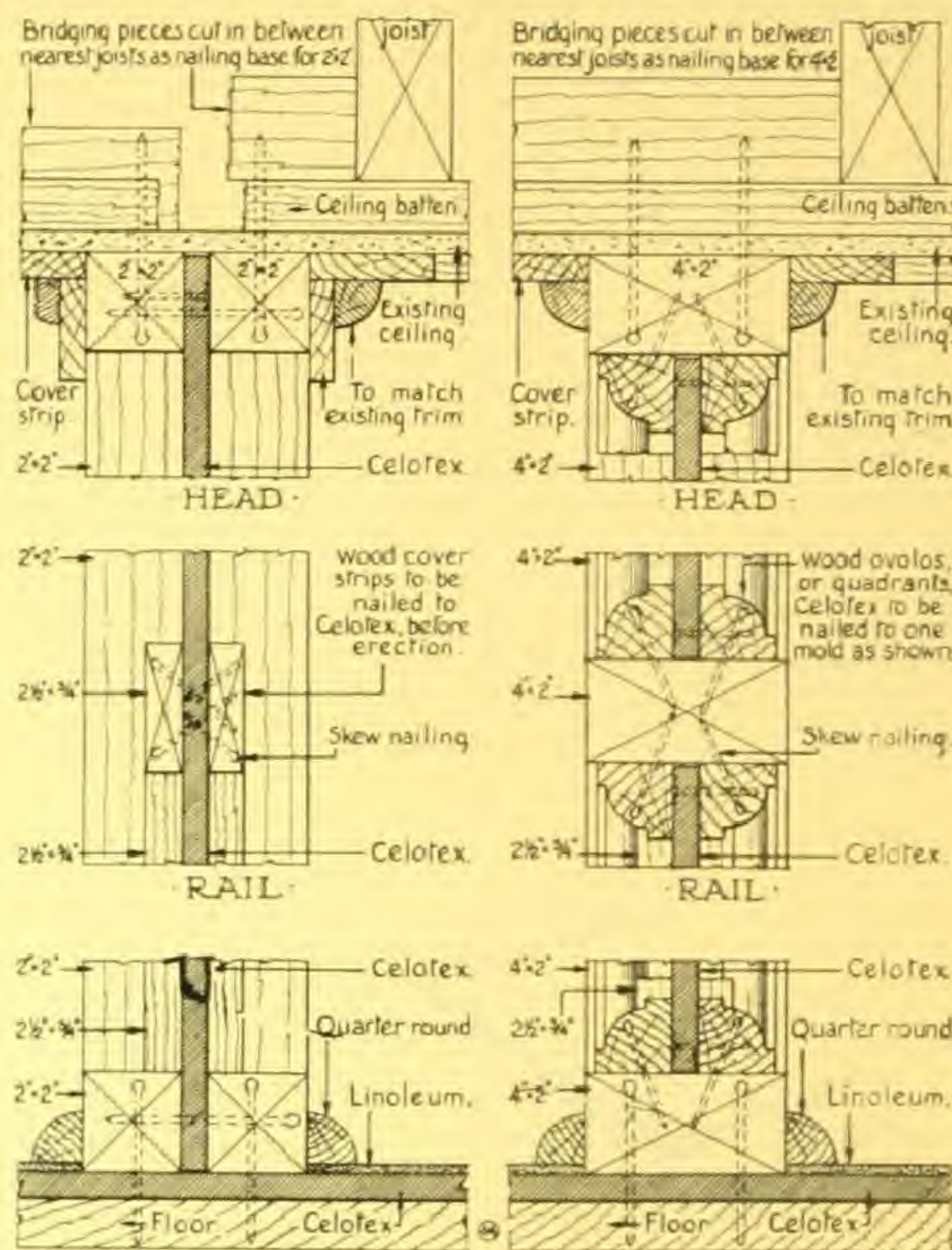
**D4. INTERIOR LININGS—NON-LOAD-BEARING PARTITION WALLS—SINGLE-THICK CELOTEX (7/16th in.):** Frame 2 in. x 2 in. for studs and plates (larger timber for more substantial construction) studs on 36 in. or 48 in. centres, plates at floor and ceiling. For partitions 12 ft. or more in height, or when additional strength is desirable, cut in 2 in. x 2 in. headers at door height. In addition to this framing, stiffening battens must be provided the long way of each panel at 24 in. centres or less. Fix stiffening battens 2 1/2 in. x 2 in. (larger if required) down centre of each panel and at door height (chair rail or picture rail if desired). Place stiffening battens opposite each other on both sides of panels, nailing battens through Celotex securely to each other. Do this before fixing the Celotex panels to framing. Note that battens for stiffening must be cut to fit into framing. Nail stiffened panel Boards to studs with 1 1/2 in. galvanized clout nails on 3 in. centres and cover Board joints (and headers if used) with 2 in. x 2 in. studs nailed through to studs (or headers) opposite. For more substantial construction double or triple-thick laminated Celotex may be used instead of single-thick Board. Galvanized clout nails of sufficient length to enter studs at least one inch must be used for fixing multiple-thick Celotex. A partition less than ceiling height may be built as directed, provided both ends are securely supported and a 6 in. x 2 in. top plate used in lieu of ceiling.



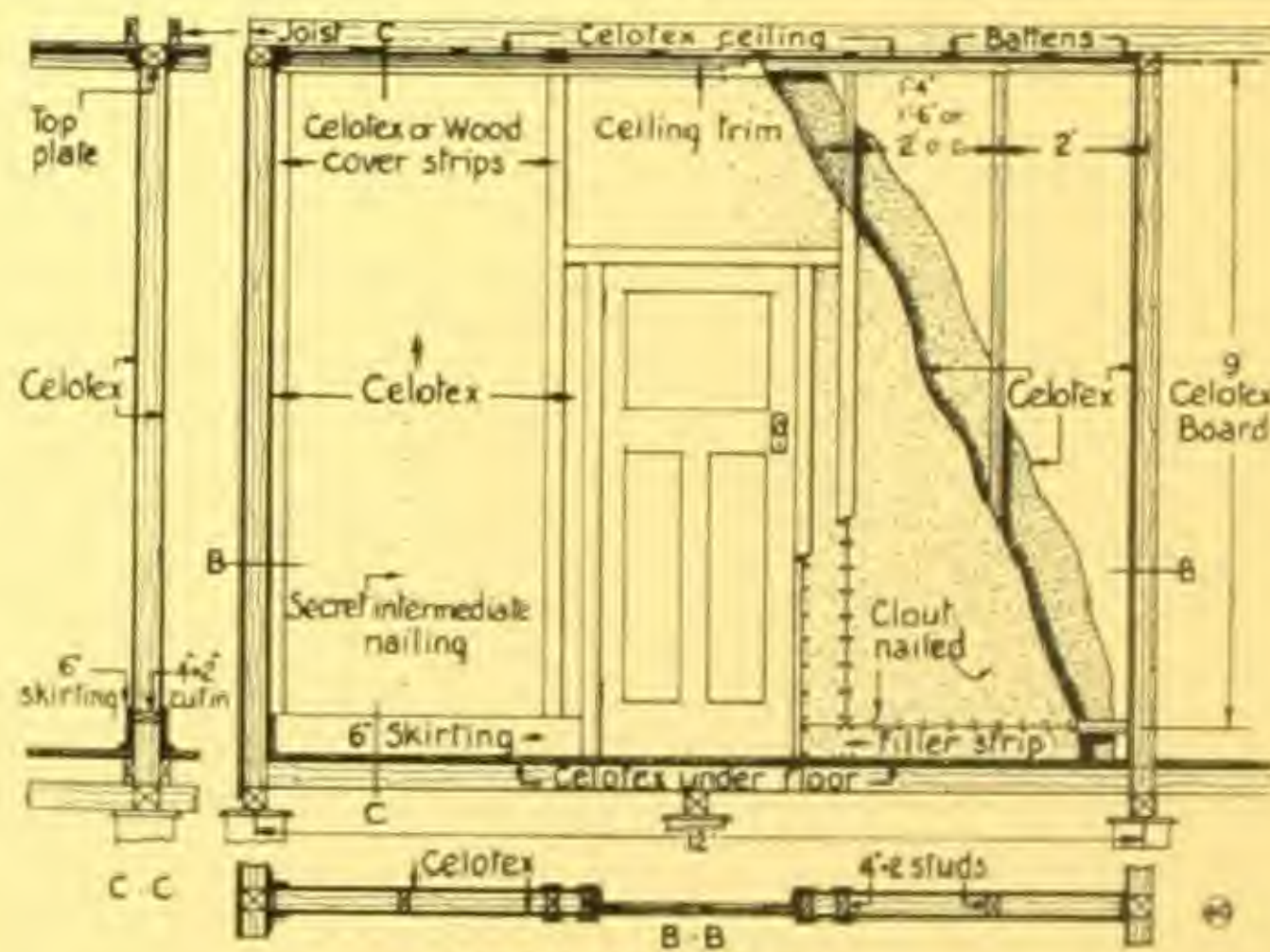
DRAWING D5 (a).

With studs and plates form a frame for either 3 ft. or 4 ft. wide Celotex. Note spacing distance between studs. Celotex panels are nailed to 1 1/2 in. mouldings. See Drawing D5 (b) for details at floor, rail and head.

**D5. INTERIOR LININGS—NON-LOAD-BEARING PARTITION WALL—SINGLE-THICK CELOTEX (7/16th in.):** Frame (studs, top and bottom plates) with 3 in. x 2 in. or 4 in. x 2 in.; space between studs (not on centre) 35 13/16th in. for 3 ft. widths or 47 13/16th in. for 4 ft. widths of Celotex. Cut in headers (same size as studs) between all studs at door height. Select any desired pattern of 1 1/2 in. substantial moulding that may be used as a nailing base. Nail moulding securely around inside of each panel formed by studs, plates and/or headers. Cut Celotex to fit panels and, before fixing, stiffen each Board through centre as directed in D4; cut stiffening battens short top and bottom, scribed at ends, to fit moulding. Nail stiffened Celotex Boards securely to moulding with 1 1/2 in. galvanized clout nails on 3 in. centres. Complete framing by nailing moulding around panels, nailing both to framing and through Celotex to opposite moulding. See Drawings D5 (a) and D5 (b). With double or triple-thick Celotex, stiffening battens may be omitted. This partition, less than ceiling height, may be built as directed with a secure anchorage for both ends and a 6 in. x 2 in. top plate used in lieu of ceiling.



DRAWING D4 (b), see D4 (a). DRAWING D5 (b), see D5 (a).



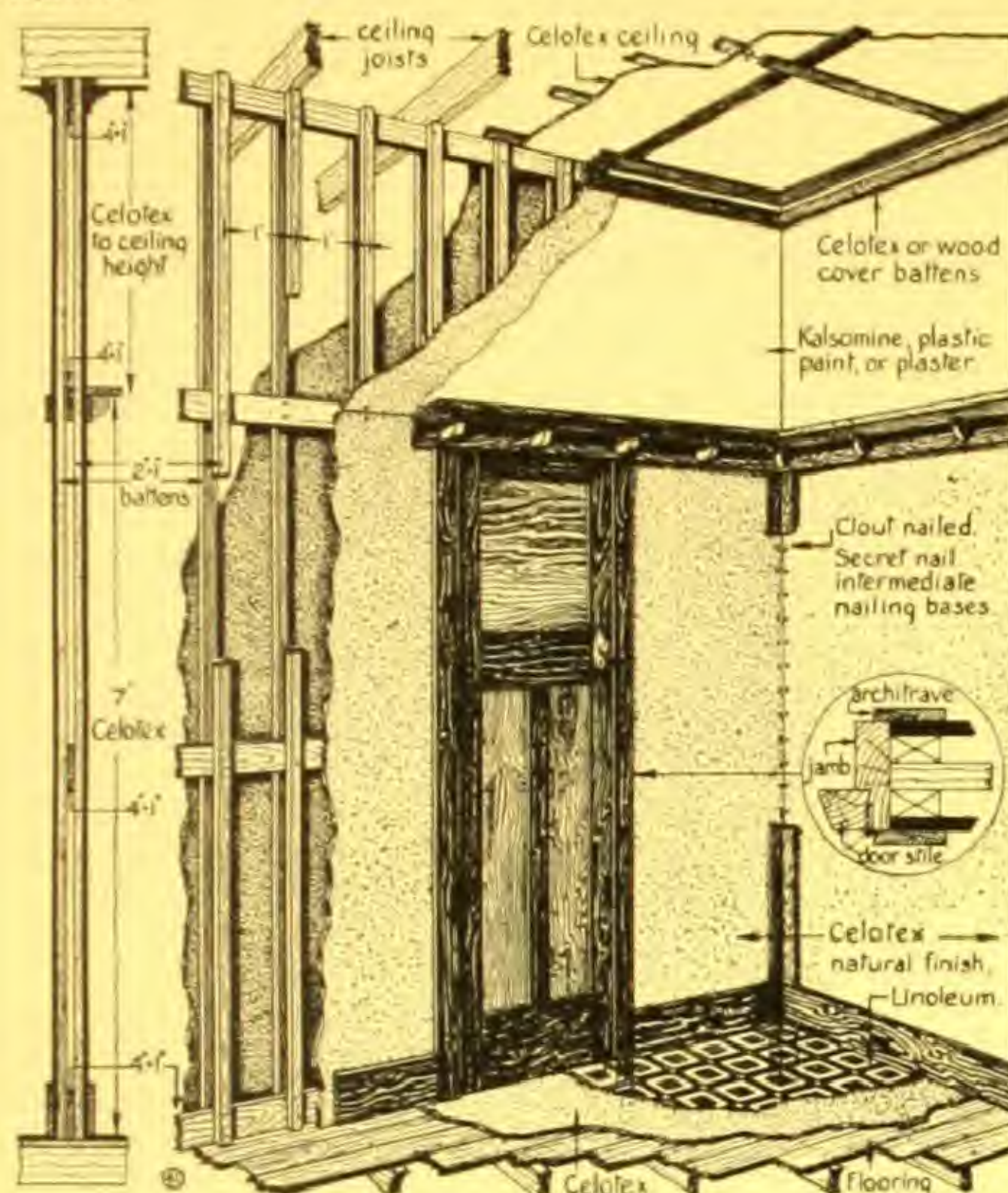
DRAWING D5 (c).

Frame LOAD BEARING partitions with studs on 16 in., 18 in. or 24 in. centres. Nail Celotex to one or both sides as directed. Headers should be provided at Board ends and back of skirtings; pieces of Celotex for filler strips may be used back of skirtings.

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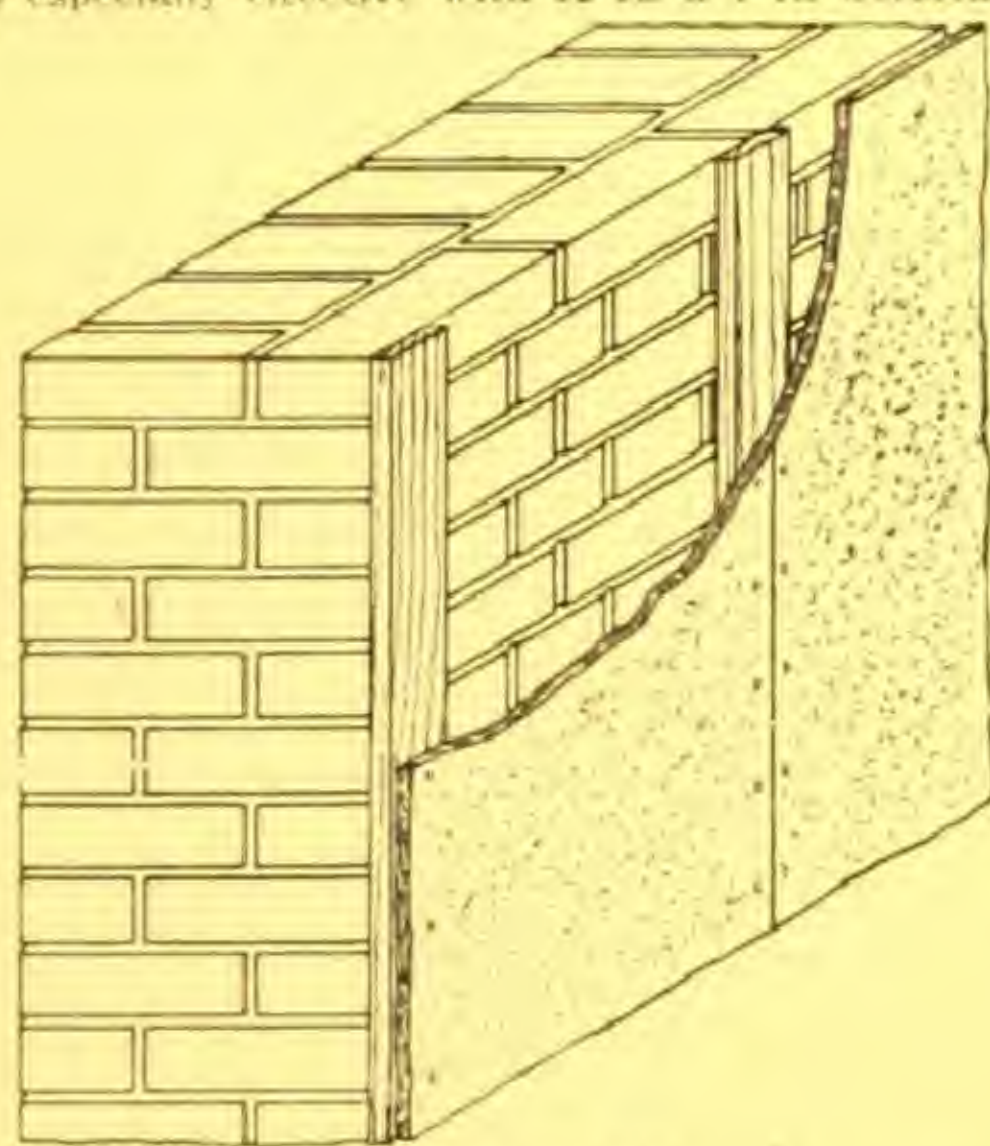


**D6. INTERIOR LININGS—NON-LOAD-BEARING PARTITION WALL—CELOTEX ON BOTH SIDES—LIGHT-WEIGHT FRAMING:** Frame with 4 in. x 1 in. wood boards (on edge) for top and bottom plates, and rails at door and chair rail height. Space 2 in. x 1 in. battens vertically on both sides of plates and rails, on 12 in. centres, as studs. While partition is on floor, lay out frame and nail Celotex to one or both sides. Dampen D8, select D9, fix D10, and nail Celotex D11, as directed, then raise partition wall into place. Cut Celotex flush with framing at all door or other openings. Framing should conform to the design of Board spacing or panelling required.



DRAWING D6.

This partition wall is a real time-and-space saver. Measure height and length of partition, lay out and frame on floor. Finished partition is only 4 in. wide, it therefore saves floor space. With 12 ft. x 7 ft. Celotex Boards it is possible to secure long wall surfaces, without cover battens over Board joints. This light-weight, thin, labour-saving, non-load-bearing partition may be built with either 3 ft. or 4 ft. wide Boards, but it is especially effective with 12 ft. x 7 ft. Celotex Boards.



DRAWING D7.

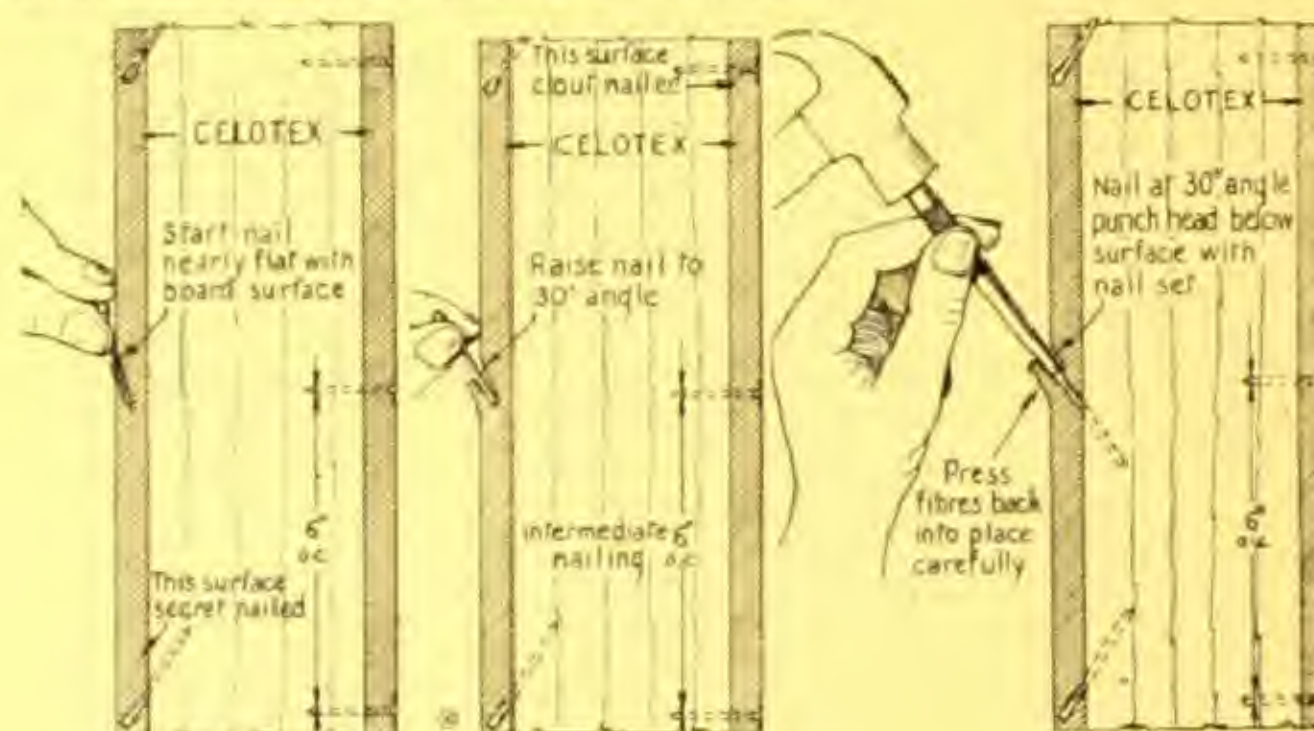
Lining a brick wall with Celotex. Fasten 3 in. x 1 in. battens over brick, stone or concrete walls or ceilings by plugging (or nailing if possible), then nailing Celotex to battens; Celotex may be cemented directly over a brick wall with neat hardwall plaster mixed with glue size instead of water. In new brickwork, horizontal rows of coke breeze bricks laid out  $\frac{1}{2}$  in. from face of wall on not over 18 in. centres will provide a nailing base for Celotex.

**D7. INTERIOR LININGS—MASONRY CONSTRUCTION—NEW OR EXISTING WALLS AND CEILINGS:** Frame the four extreme dimensions of each wall or ceiling with 3 in. x 1 in. battens, then fix 3 in. x 1 in. battens spaced on not over 18 in. centres over the surface to be lined with Celotex, to conform to the Board spacing or panelling required. Fasten battens securely to masonry by plugging (or nailing if possible) to the brick, stone or concrete. Cut in header battens where necessary (nailing securely to plugged battens) to provide a firm nailing base along all Celotex Board edges (both ends and sides). Dampen D8, select D9, fix D10, and nail Celotex D11, as directed.

**D8. INTERIOR LININGS—CONDITIONING OR DAMPENING CELOTEX BEFORE FIXING:** Because Celotex (like timber, timber linings, architraves, etc.) responds to some extent to changes in humidity and temperature, though not to so great a degree as timber, some discretion should be exercised in conditioning Celotex for linings, before fixing. Ordinarily a Celotex lining should not be fixed until just before architraves are fixed, and for that reason, should not be dampened, if at all, until the day before the Boards are to be fixed. During ordinary weather Celotex Boards for linings should be brought into the building where they are to be used and stood singly around the rooms for at least 24 hours before fixing, so that each Board may adjust itself to existing climatic conditions. **NOTE THIS EXCEPTION, HOWEVER:** During dry, hot weather, or when hot winds are blowing, instead of standing Boards around rooms, dampen, by lightly sprinkling Celotex with clean water 24 hours before fixing. Sprinkle one side of Board only, stacking flat in a pile. Fix Celotex promptly and finish all nailing immediately after removing from dampened pile. Keep Celotex clean. Protect edges, corners and Board surface from oil, dirt and damage.

**D9. INTERIOR LININGS—SELECTION FOR TEXTURE AND COLOUR:** Just as there is a difference in the grain and colour of timber, so Celotex texture and colour varies slightly. With two sides to each Celotex Board, both texture and colour are very easily matched, but it is a matter that should always have careful consideration before fixing. The texture is important when Boards are stained, kalsomined or painted, and both texture and colour are important when Celotex is left in its natural tan colour without decoration.

**D10. INTERIOR LININGS—FIXING:** Nail Celotex lengths vertically over studs, and lengthwise over joists or battens (except 12 ft. x 7 ft. Boards). Provide a substantial base for nailing along all Board edges (both ends and sides). Leave  $\frac{3}{16}$  in. space between adjoining Boards and at Board ends. Celotex is made scant in width and length to allow for this space. Never force Celotex Boards into place. In existing frame construction it is generally possible to nail Celotex direct to existing framing or surfaces.



DRAWING D11.

Secret nail exposed surfaces of interior Celotex linings. Note and follow instructions carefully. Space all secret nailing on 3 in. centres, skewed alternately and punched in; never drive panel pins straight in. Drive clout nails straight into framing with heads slightly below surface of Celotex.

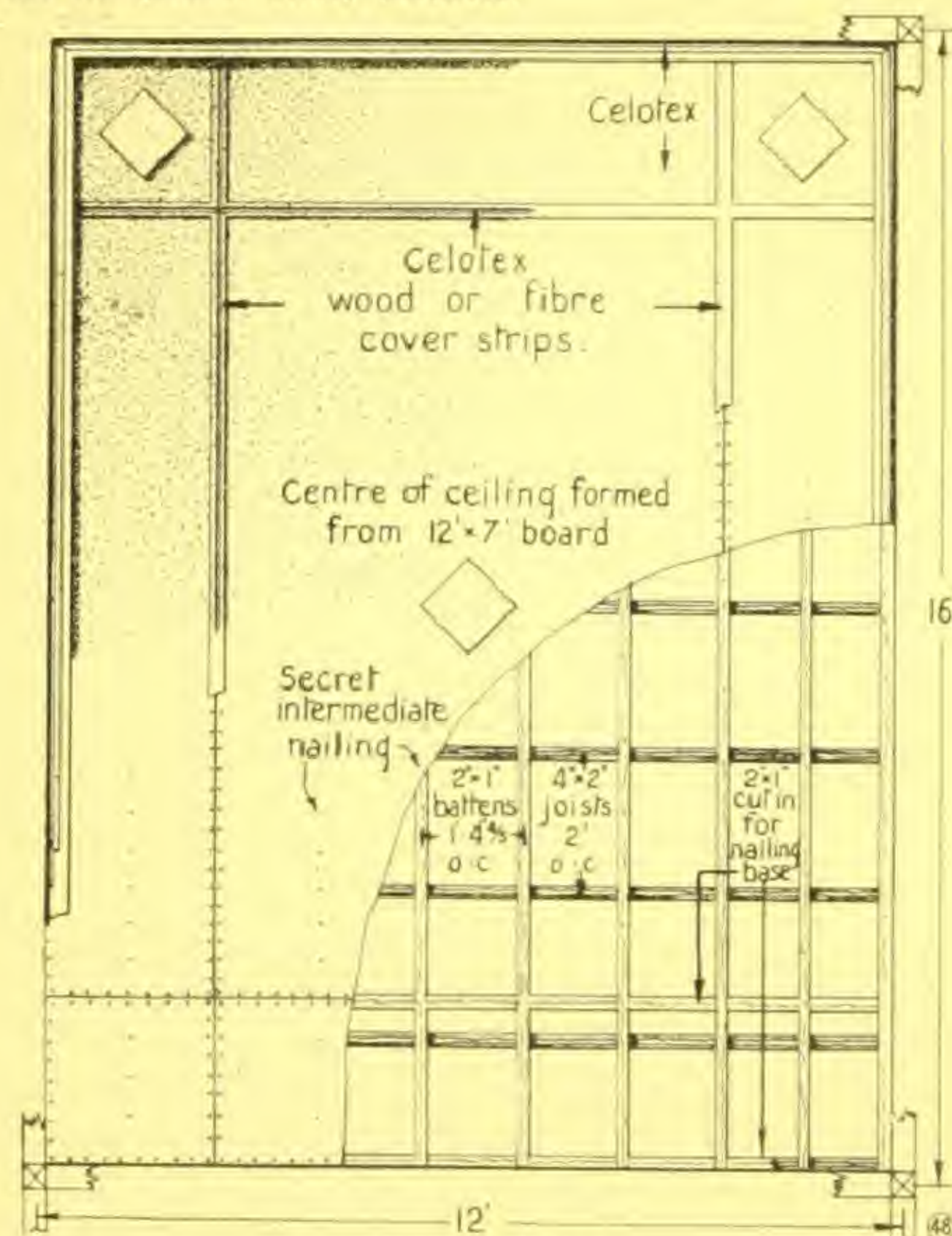
**D11. INTERIOR LININGS—NAILING:** When Celotex is to be left in its natural colour or when its texture or nail heads would show through the decorated surface under stencilling, staining, painting, etc., all such exposed surfaces should be secret nailed. Begin at the top of each Board; first secret nail over intermediate studs, joists or battens with 2 in. panel pins, 12 or 14 gauge, spaced 3 in. apart; then nail all Board edges (both ends and sides) in same way (panel pins are recommended, but diamond or rose-head finishing nails may be used). Secret nailing should always conceal the nail heads without marking the Board surface with the nail hole or hammer head. This may be accomplished by holding panel pin at an almost flat angle, pushing nail point under Celotex fibre a half-inch or more, then raise nail to angle at which it is to be driven, drive nail at a 30 degree angle almost to Board's surface and finish driving, with nail punch, slightly below the surface of the Board. Close nail hole by rubbing with a small piece of Celotex. Secret nailing requires that each panel pin be driven at a sharp opposing angle to the preceding nail (skewed alternately and punched in); never drive panel pins straight in, viz., at right angles to the surface. For hardwood framing use panel pins  $1\frac{1}{2}$  in. long. Each 100 sq. ft. of Celotex surface requires  $\frac{1}{2}$  lb. panel pins for nailing intermediate framing; Board edges (ends and sides) require  $1\frac{1}{2}$  lbs. panel pins. When nail heads are to be covered with cover strips, battens, skirtings, architraves or mouldings, use  $1\frac{1}{2}$  in. clout nails for all covered Celotex surfaces; use panel pins for all exposed surfaces. When entire surface of Celotex is to be covered with plastic paint, wallpaper or plaster, begin

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at the top of each Board, nail intermediate framing first, then all Board edges (ends and sides) with  $\frac{1}{2}$  in. galvanized clout nails, 10 or 12 gauge,  $\frac{3}{4}$  in. heads. Space clouts 6 in. apart over intermediate framing, 3 in. apart along Board edges (ends and sides)  $\frac{3}{4}$  in. from all edges. Each 100 sq. ft. Celotex surface requires 380 nails (12 gauge galvanized  $\frac{1}{2}$  in. clouts) for fixing. Drive clout heads slightly below Celotex surface. For hardwood framing use  $\frac{1}{2}$  in. clouts. Except when instructed to bring Board edges into close contact, cut open any Board joints, or top or bottom of Boards spaced less than  $\frac{3}{16}$  in. Rectify any surface unevenness, particularly at Board joints, with sandpaper.

**D12. INTERIOR LININGS—12 ft. x 7 ft. CELOTEX BOARDS**  
—FRAMING: Note instructions for framing under D1 to D6 inclusive; give particular attention to the spacing of studs, joists, headers, battens, and to the design of Board panelling required, so as to eliminate Board joints as far as possible. Walls built with 12 ft. x 7 ft. Boards require few cover battens. Most wall surfaces, even in large rooms, are broken by door or window openings, so that few wall areas are more than 12 ft. wide. The 7 ft. width may be used either from floor to top of door framing or from ceiling to chair rail, and 2 ft., 3 ft., or 4 ft. width Boards (depending on ceiling height) either above door height or below chair rail. **FOR CEILINGS:** 12 ft. x 7 ft. Boards may be combined with 3 ft. and 4 ft. width Boards into ceilings, using very few cover battens. 12 ft. x 7 ft. Boards are specially adapted for lining interior walls and ceilings, but a Board of this area should not be used for butt, V-grooved, round-edge joints, or as a base for plaster or plastic paint, either on exterior walls or interior linings, except when Board joints are covered with cover battens. Never use 12 ft. x 7 ft. Boards under carpets or linoleum or for exterior roof insulation. While the use of 12 ft. x 7 ft. Boards is limited to lining interior walls and ceilings, these are by far the largest areas to be insulated and quieted; very definite savings and superior construction are possible with this large Celotex Board, which practically eliminates cover battens. Dampen, select, and fix as instructed, D8 to D11 inclusive. The 12 ft. x 7 ft. Boards may easily be cut in various useful sizes. For this reason it is a very practical size for general utility purposes.

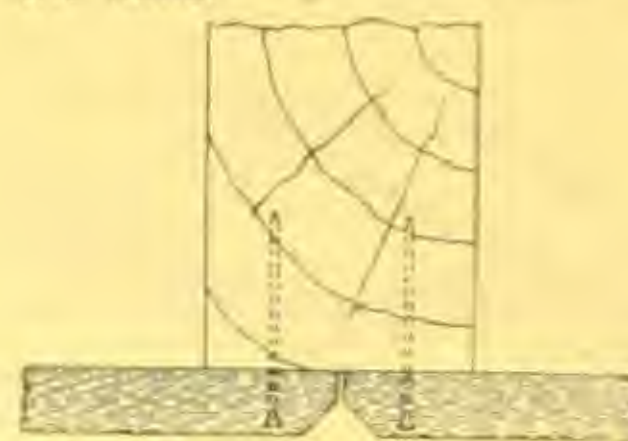


DRAWING D12

Reflected ceiling plan, using 12 ft. x 7 ft. Board for centre; 2 ft., 3 ft., or 4 ft. wide Boards for border, depending on size of ceiling. It is usually easier to prepare a level ceiling surface with 2 in. x 1 in. battens over ceiling joists, spaced to fit design of panel required. Ceiling joists (non-load-bearing) may be framed on 2 ft. centres and crossed with 2 in. x 1 in. battens. Secret nail all Board surfaces not covered with cover battens; always cover 12 ft. x 7 ft. Board joints with cover battens.

**D13. INTERIOR LININGS—BUTT, V-GROOVE AND ROUND EDGE JOINTS—FRAMING:** In new construction, space studs, joists, headers or battens to fit the actual width of Celotex, either 15 $\frac{1}{2}$  in. or 17 $\frac{1}{2}$  in. on centres for 4 ft. and 3 ft. width Boards respectively. In existing construction, when the framing is not suitable for a firm nailing base, over exposed framing provide a nailing base by fixing 2 in. x 1 in. battens to the sides of studs or joists, putting in an extra stud or joist where necessary; or by fixing battens at right angles over existing framing on not more than 16 in. or 18 in. centres. Provide a substantial nailing base at all Board edges (both ends and sides). Condition, select, fix and nail Celotex Boards

as in D8 to D11 inclusive. Fix Celotex to the required decorative design. At all joints bring Board edges to close contact, but do not force Celotex into place. Secret nail all surfaces (skewed alternately and punched in), beginning over intermediate framing, then along all Board edges. Do not use clout nails. Rectify any surface unevenness, particularly at Board joints, with sandpaper. The bevelling of Board edges is best done before fixing. Boards for V-groove joints may be bevelled with a circular saw tilted at the proper angle, or with a special bevelling tool, or a sharp linoleum knife, or with a sandpaper block. Rounded edges are best made with sandpaper held in the hand.



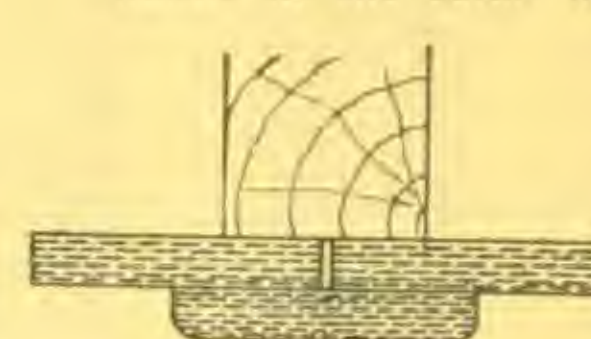
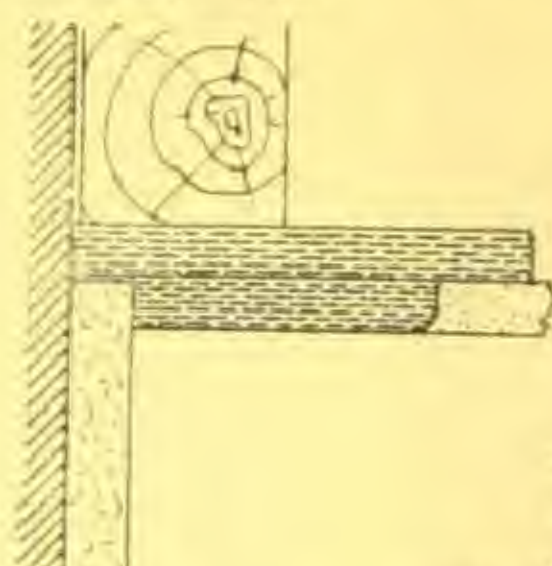
DRAWING D13 (a).

Celotex V-groove joint nailed over wood framing with 2 in. panel pins spaced 3 in. apart, driven at a 30 degree angle and at an opposing angle to the preceding panel pin.



DRAWING D13 (b).

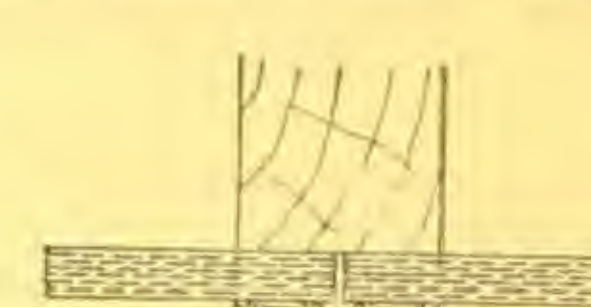
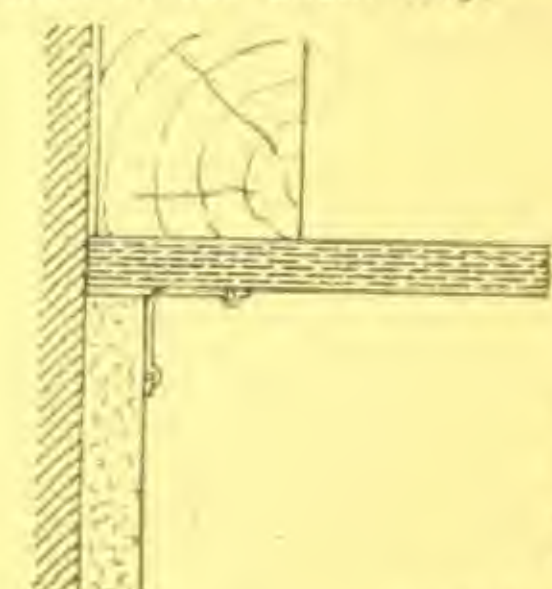
Celotex Round-Edge joint fixed with brass or copper, round-head nails  $1\frac{1}{2}$  in. long, spaced regularly not over 1 in. apart. Butt or V-grooved joints may be nailed in the same way.



CELOTEX OR WOOD PANEL STRIPS IN CORNER &amp; ALSO ON CEILING JOINTS.

DRAWING D14

**D14. INTERIOR LININGS—COVER BATTENS AND MOULDINGS:** Fix wood or metal battens, fibre cover-strips, plaster mouldings, or Celotex battens to cover Board joints, or wherever desired, to frame panels or other decorative designs, in the usual way.



SPECIAL FIBRE STRIP BENT &amp; GLUED INTO CORNER, CEILING JOINTS COVERED WITH SIMILAR STRIP GLUED ON.

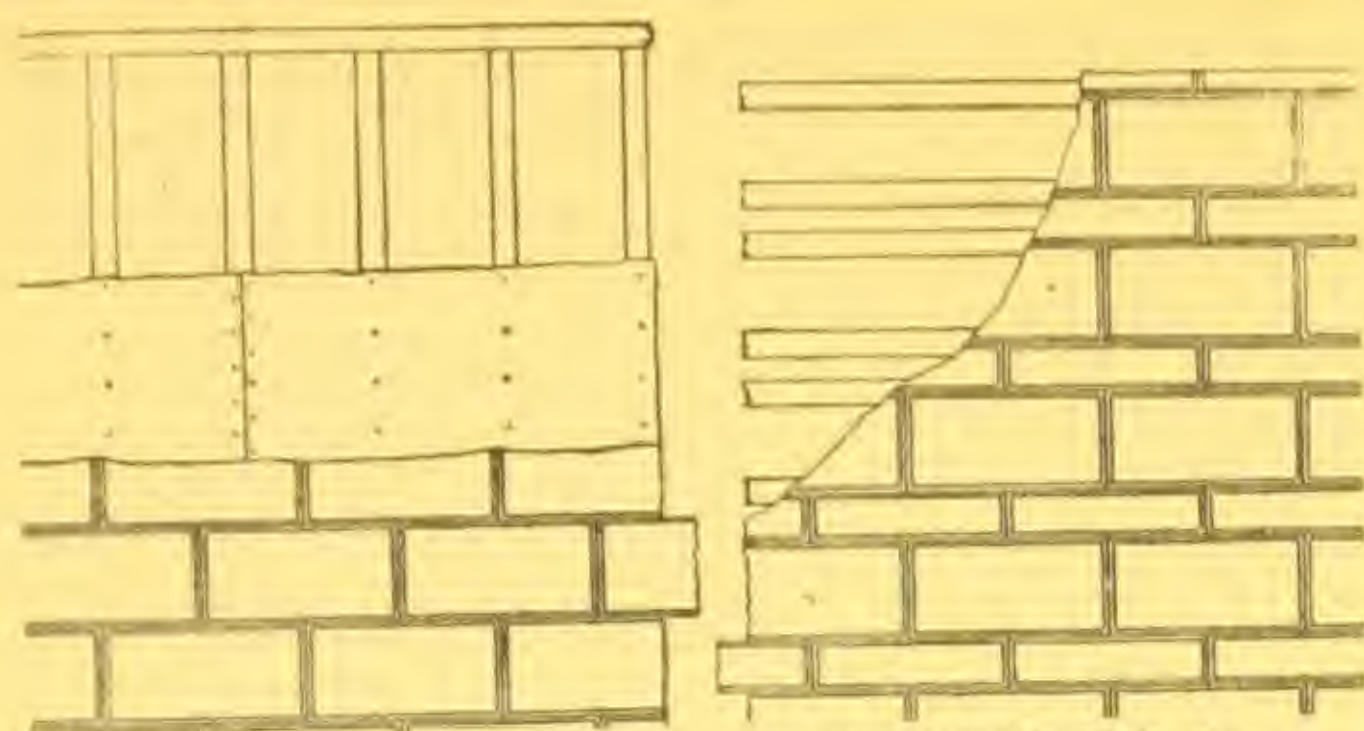
DRAWING D15

**D15. INTERIOR LININGS—FIBRE COVER-STRIPS:** Glue or paste over Board joints or wherever required to produce the desired panelled effect; over corners (exterior and interior) use a double width fibre strip. Fibre strips may be painted or stained either before or after fixing. Rectify any surface unevenness at Board joints with sandpaper before fixing strips. To fix, cover the back of fibre strip, 1 in. from each edge only, with a heavy coat of glue or paste; be careful to keep adhesive away from corrugations in the centre of fibre strip. Do not flatten out corrugations when pasting strip into place. In tropical countries, or where high humidities prevail, casein glue should be used for pasting. Fibre strips replace cover or panel battens; they are cheaper than wood battens, are easily pasted into place, are thin, and lie so close to the surface that, when painted or stained the colour of Celotex, they are hardly noticeable. Fibre strips, being thin, cast no shadows as do ordinary battens.

**D16. INTERIOR WALLS—ASHLAR STONE PATTERNS WITH CELOTEX:** Largely used for redecorating existing walls. Celotex is cut into horizontal strips with bevelled edges. The vertical joints are V-grooves cut into Celotex after the strips are secret nailed with panel pins and/or cemented into place; or each ashlar face may be cut separately and bevelled; any desired pattern of Ashlar stone may be selected. Two or more sizes of Ashlar may be used. In selecting a size or sizes of an Ashlar face see that the strips or blocks are cut from Celotex Boards without waste. Provide a continuous background with Celotex, wood lining, plaster, or a horizontal nailing base of 3 in. x 1 in. battens, spaced to fit the Ashlar design. Glue and secret nail to background with panel pins. Celotex Lath, size 48 in. x 18 in., supplied already bevelled, may also be used for Ashlar stone decoration. Celotex Laths are glued and secret nailed direct to studs or vertical battens on 16 in. centres (only) or they may be glued and secret nailed to any firm continuous backing that will hold a nail.

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DRAWING D16 (a).

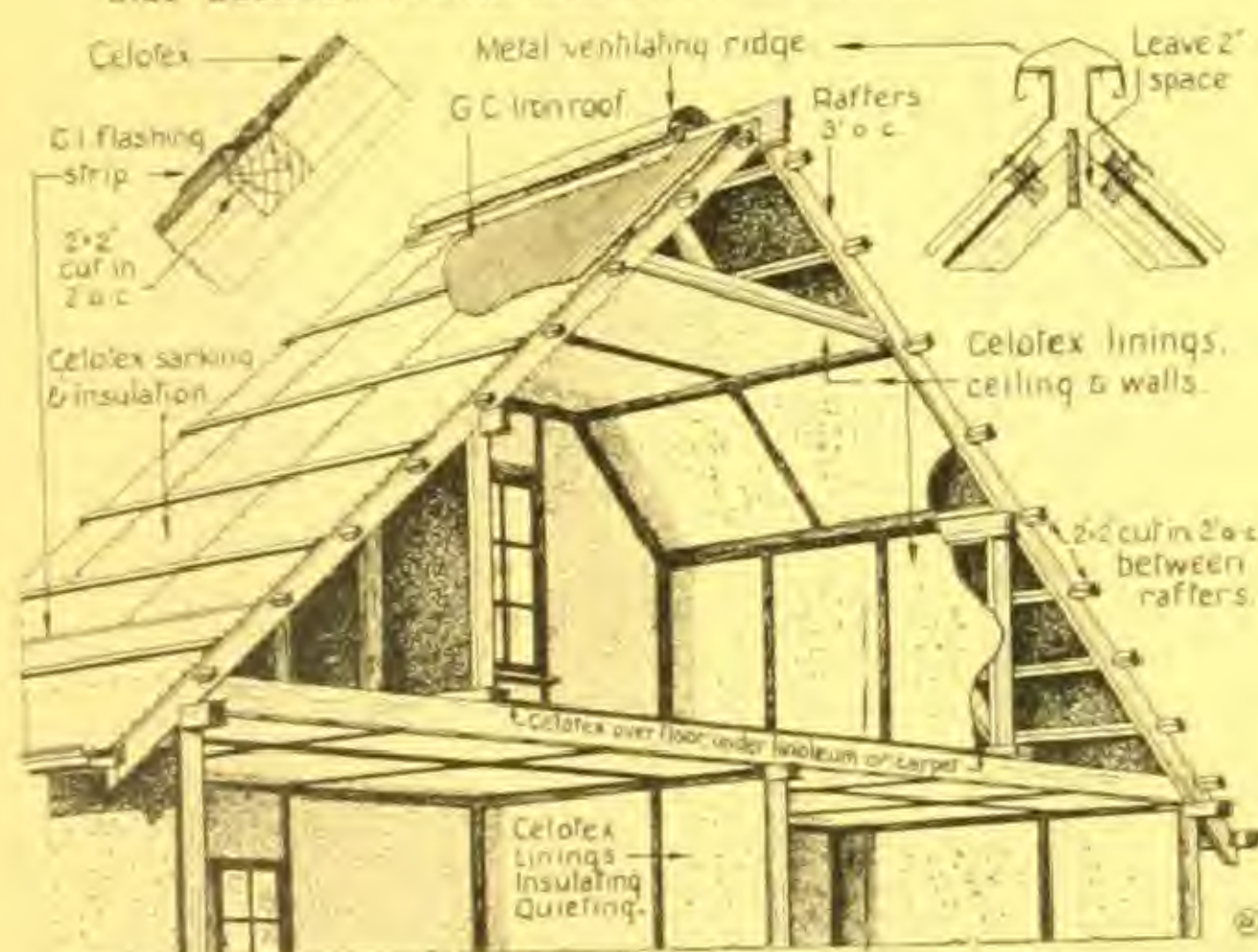
Ashlar pattern Celotex strips, bevelled edges, glued and nailed to continuous backing (plaster, wood or Celotex).

DRAWING D16 (b).

Ashlar pattern of Celotex, glued and nailed to horizontal wood battens. Vertical V-grooves cut either before or after fixing Celotex.

**D17. INTERIOR LININGS—ATTICS:** Have you ever gone into your attic on a hot summer's day—and almost suffocated? That is proof that your roof allows heat to leak IN. In winter, your roof allows house warmth to leak OUT just as easily. Your own discomfort is confirmed by building authorities who say, "because heat naturally rises, more than 60 per cent. of the avoidable heat leakage in a house, unprotected with insulation, occurs through the roof." So much heat leaks out through the roof, that about one-quarter of the money you spend in heating your house every winter is wasted. You throw away every fourth shilling you spend for heating. Attics and top floors cannot be made comfortable by ordinary roofing and lining materials, which provide very little insulation and sound-quieting. But, because Celotex insulation stops heat leakage, outside noise and moisture condensation, Celotex makes it both possible and worth while to remodel attics that are now unlivable waste space. Celotex insulation, when properly placed and fixed in your home, gives:—

- (1) GREATER COMFORT, because it keeps out Summer heat and Winter cold.
- (2) BETTER HEALTH, because it stops dampness, draughts and sudden changes in room temperature.
- (3) FUEL ECONOMY, because it stops escape of indoor warmth.
- (4) PERMANENT STRENGTH, because it provides greater bracing against distortion or settling of the building than ordinary weather-board construction, and lasts far beyond the average life of a house.
- (5) INTERIOR BEAUTY, because it may be left in its attractive natural finish of tan colour and semi-smooth texture, or may be handsomely decorated (see Section E). As a plaster base it prevents unsightly plaster cracks and lath marks.
- (6) SOUND-QUIETING, because it deadens noise from outside, also between rooms and between stories.



DRAWING D17.

Note the galvanized iron flashing strip to make horizontal joints watertight, also construction of ventilating ridge (two top insets). Ordinary building materials provide very little insulation and sound-quieting, therefore they do not make comfortable the top floors and attics of existing buildings. Celotex Insulation stops heat leakage, condensation, outside noise, and makes remodeling both possible and worth while for top floors and attics that are now waste space, uncomfortable and unlivable.

**D17 (CONTINUED):** To insulate attics under pitched roofs (X) fix Celotex over roof rafters, or (Y) cut in between roof rafters, or (Z) use as a lining on the underside of roof rafters; see B1. Insulate and quiet attic floors (and top floor ceilings) as directed in Section C. Construct, insulate and quiet attic walls and ceilings with Celotex as directed in this Section. In insulating an attic, care should be taken to fix Celotex with

a tight joint at side walls, and also to block the space at the end of and between ceiling joists with Celotex to prevent hot or cold air leakage—THIS IS IMPORTANT. When Celotex is used over ceiling joists, lay wood floors over Celotex in any portion of the attic used for storage or walk-over surface. If attic is already covered with flooring, fix Celotex over floor and, if to be used as a walk-over surface, cover Celotex with linoleum or carpet (see C19 to C21 inclusive).

**D18. INTERIOR LININGS—CELOTEX AS A BASE FOR PLASTIC PAINT—WALLPAPER—1/16th in. SETTING COAT OF PLASTER:** For either walls or ceilings, frame, dampen, fix and nail Celotex Boards as directed for substantial construction A1 to A4 inclusive. Use 1 1/2 in. galvanized clout nails. Any Boards spaced less than 3/16th in. at joints or at top or bottom of Boards should be cut open to 3/16th in. Reinforce all Board joints and corners with a 4 in. strip of galvanized flywire. With coarse sandpaper smooth down a strip 6 in. wide over all exposed joints and corners about 1/16th in. below Board's surface; then cover with strips of galvanized flywire 4 in. wide, bonding the wire strips with Swedish putty (see E11), thick Metropolitan Plastic Paint (see E13), neat hard-wall plaster or Keen's cement (both mixed with glue size). Hold the wire strip with one hand, do not nail into place except temporarily at one end when fixing ceiling joints. Work bonding cement through the wire mesh into close contact with the Celotex with a trowel or scraping knife. Spread the bonding cement beyond both edges of the flywire for at least an inch, so that the wire edges will not show through the covering treatment. Avoid building up the bonding cement underneath the galvanized flywire. Reinforce all interior and exterior angles, also joints and angles between masonry walls and Celotex, with 6 in. strips of galvanized flywire; bend over or into corners, and bond as directed above. Allow wired joints and angles to set or dry at least one day. Before applying plastic paint, wallpaper or 1/16th in. plaster coat, inspect wired joints and corner angles to be sure that they are securely fixed, and that they present a smooth level surface. Glue size Celotex before applying wallpaper or plastic paint containing oil. DO NOT SIZE BEFORE PLASTERING. Board joints that are to be covered with battens or Old English half-timbered construction need not be wired. Plaster before fixing architraves. Fix architraves and wood trim before applying plastic paint D19, or wallpaper D20.

**D19. INTERIOR LININGS—PAINTING AND PLASTIC PAINT:** When Celotex is to be left in its natural colour, or when the texture or nail heads would show through the decorative treatment such as stencilling, staining, kalsomine, distemper, paint, etc., then secret nail all such exposed surfaces (see D11). When Celotex is to be covered with plastic paint, wallpaper, or plaster, use 1 1/2 in. galvanized clout nails. First prime (or glue size) before applying oil paint or plastic paints containing oil. For decorative treatments over Celotex, see Section E, and Plastic Paint formula E12.



PICTURE D20.

Preparing Celotex joints for Wallpaper, Plastic Paint, or 1/16th in. setting Coat of Plaster. Sand a 6 in strip at joints and corners, 1/16th in. below Board's surface. Fix galvanized flywire with bonding cement. Glue size surface and hang wallpaper in usual way.

**D20. INTERIOR LININGS—WALLPAPER OVER CELOTEX:** Prepare wall and/or ceiling surface of Celotex as directed in D18. Point up all nail heads with bonding cement. Inspect carefully, see that surface to be papered is smooth and particularly that wired joints and corners are level with the surface. Apply heavy coat of glue size before papering—2 lbs. of glue dissolved in 1 gallon (10 lbs.) of hot water; use while warm. Hang wallpaper in the usual way. For thin or light coloured wallpapers, first apply heavy lining paper or 1/16th in. setting coat of plaster to prevent texture or colour of Celotex showing through.

**D21. INTERIOR LININGS—PLASTER—1/16th in. SETTING COATS OVER CELOTEX:** This specification is only for Celotex Boards, NOT CELOTEX LATH. Prepare wall and ceiling surface of Celotex as a base for plaster as directed in D18. Bond galvanized flywire strips with neat hardwall plaster or Keen's Cement (both mixed with glue size). Inspect wired joints and angles to be sure they are securely fixed. Celotex, used as a plaster base, must not be sized. Do not dampen Board after fixing.

Prepare setting plaster coat with two parts of lime putty and one part hardwall plaster or Keen's Cement. On a mixing board make a depression in the centre of a batch of lime putty, pour water into this hollow and sift in hardwall plaster or Keen's Cement. Mix thoroughly into a uniform paste. Do not mix a larger batch than can be applied in twenty minutes;

(Continued on next page)



vary the size of each batch mixed according to the number of plasterers working. Every 100 sq. yards of a 1/16th in. setting coat will require 200 lbs. of lime putty and 100 lbs. hardwall plaster or Keen's Cement. The setting coat should be thoroughly trowelled, going over the surface with a wet brush as the plaster begins to stiffen, then trowel to a smooth level finish. Ordinary lime mortar or Portland cement mortar must not be used directly over Celotex.



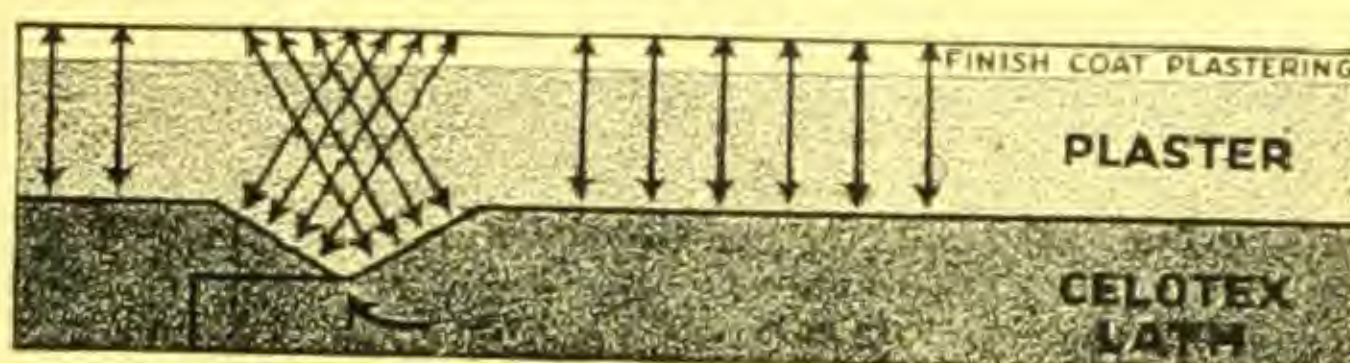
PICTURE D21

Board joints reinforced with galvanized flywire strips, then Celotex plastered with 1/16in. setting coat.

**D22. INTERIOR LININGS—CELOTEX LATH AS A BASE FOR 1/2 in. PLASTER COATS—FRAMING:** Celotex Lath is supplied 1/2 in. and 1 in. thick, both thicknesses 48 in. long, 18 in. wide, with all edges bevelled and the two long edges shiplapped. Frame studs, joists, rafters and battens as in ordinary frame construction, spaced accurately on 16 in. centres. When framing surface is not level, or not accurately spaced on 16 in. centres, cut in headers (solid strutting or nogging) where necessary, to provide a firm intermediate nailing base on not more than 16 in. centres and at Board ends.

**FIXING—**Never dampen Celotex Lath before or after fixing. Nail the long edges of Celotex Lath at right angles to the framing with bevelled edges exposed to receive and reinforce the plaster. Centre all end joints on framing with joints of each course of Lath offset or staggered with the joints of the preceding course. When cutting and fitting are necessary, saw, cut or score with hatchet; do not hack, chop or break. Cover all surfaces to be plastered with Celotex Lath; do not piece out with wood lath. Reinforce all exterior and interior angles, also joints and angles between masonry and Celotex with 6 in. strips of expanded metal lath or 16 gauge wire mesh bent over or into corners, nailed or stapled into place. With 1 in. thick Celotex Lath make due allowance for electric wiring conduits, switch and outlet boxes; also provide for extra thickness of lath at all wall and ceiling openings (doors, windows, ventilators, frames, etc.) See Drawings D22 (b) and D22 (c).

**NAILING—**Nail each Celotex Lath at every framing support, first over intermediate framing, then at ends, with not less than five galvanized 1 in. clouts (for 1/2 in. thick lath), 1 1/2 in. clouts (for 1 in. thick lath); clouts to be spaced uniformly 3 in. apart.



DRAWING D22 (a).

The bevelled edge and shiplap joint of Celotex Lath eliminate the open spaces between ordinary lath where plaster cracks and blemishes most often occur. Over Celotex Lath plastered interiors maintain their original beauty. Celotex also adds strength, insulation and sound-quieting to any structure.



PICTURE D22 (b).

Reinforce Celotex Lath at all corners, Celotex Board at both joints and corners, with expanded metal lath.

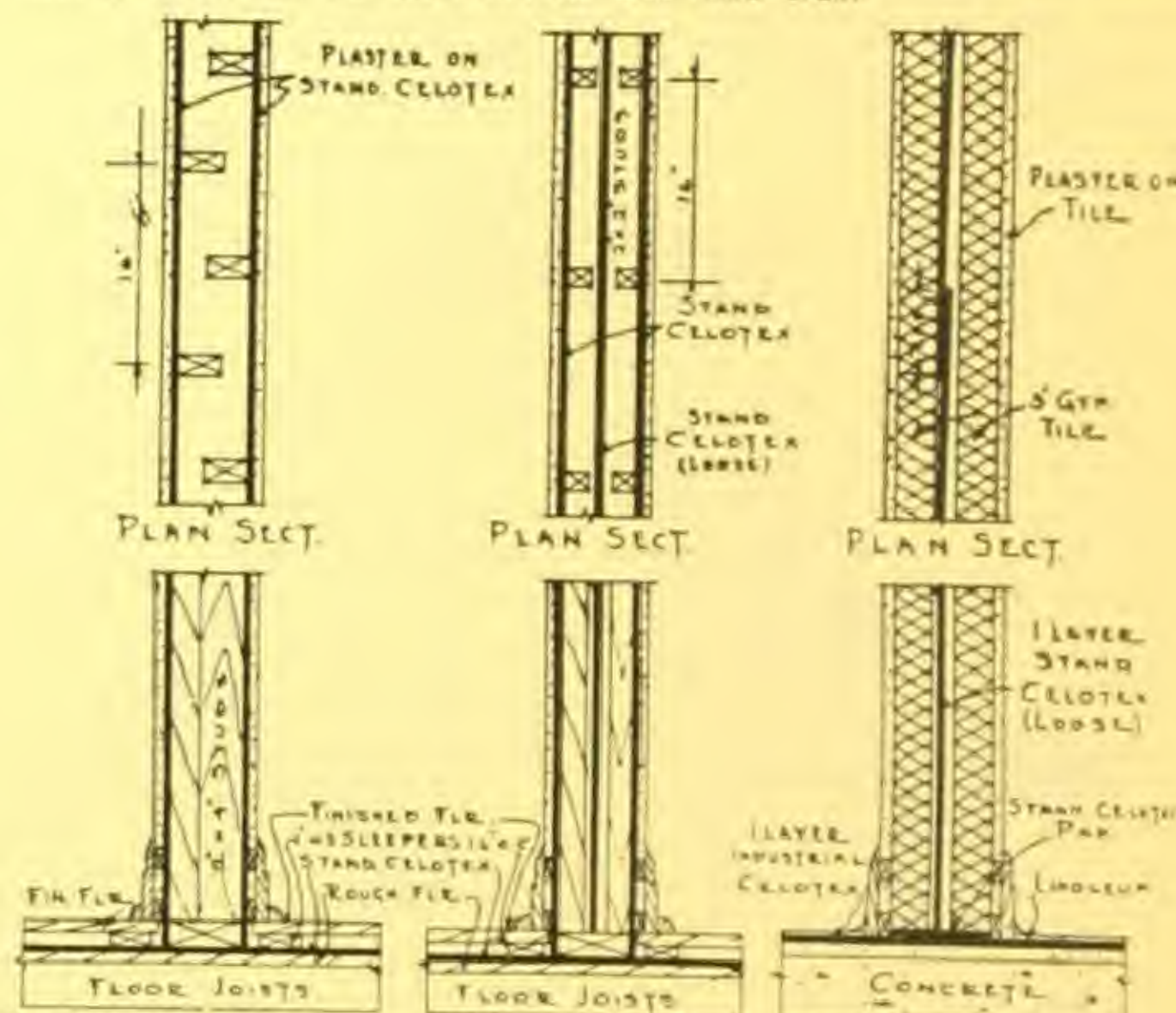
**D23. INTERIOR LININGS—CELOTEX AS A BASE FOR 1/2 in. COATS OF PLASTER—PLASTERING:** Inspect carefully for proper nailing, reinforcement of all angles, see D22. When Celotex Standard Building Board is used (instead of Celotex Lath), frame, dampen, fix and nail as directed in A1 to A4 inclusive. In addition, see that all Board joints are reinforced with 4 in. strips of expanded metal lath or 16 gauge wire mesh as directed for reinforcing angles in D22; also all angles.

Do not moisten or wet Celotex Lath or Celotex Boards after nailing or before plastering. Use hardwall plaster or Keen's Cement mixed with clean, dry sand, not more than two parts of sand to one of plaster. Ordinary lime mortar, or Portland cement mortar, or lime or cement mixed with hardwall plaster must not be used on the first or floating coat. Mix floating coat to a plastic consistency so as to allow for light trowel pressure and to facilitate darbying. Rod and darby floating coat to a level surface. Should plaster become stiff, wet down the surface to allow for darbying without exerting heavy pressure. Darby, rod or float strokes should always be in the direction of and should span two studs, joists, rafters and/or battens. Apply first or floating coat not less than 3/4 in. thick direct to Celotex; force plaster through all metal reinforcing into close contact with Celotex and into all bevelled edges of Celotex Lath. Allow first or floating coat to dry thoroughly, then follow with setting coat of usual mixture of lime putty and hardwall plaster. ALWAYS USE 1/2 in. COAT OF PLASTER, AS INSTRUCTED ABOVE, OVER CELOTEX LATH. Thoroughly ventilate freshly plastered rooms either in Winter or Summer after the plaster has set. Ventilation is important for the proper drying of plaster and to protect against failure of plaster due to improper drying. All new plaster shall be protected from hot drying winds and freezing weather.



DRAWING D22 (c).

Framing for Celotex Lath must be on 16 in. centres; stagger vertical joints; nail; reinforce corners with expanded metal and plaster, all as directed in D22 and D23.



DRAWING D24 (a). DRAWING D24 (b). DRAWING D24 (c).

D24 (a).—Staggered stud wall framed on not more than 16 in. centres. For plaster base, fix either Celotex Lath or Celotex Boards; plaster both sides of partition with 1/2 in. coat hardwall plaster, as directed in D22 and D23.

D24 (b).—Double stud wall framed with 2 in. x 2 in. studs on not more than 16 in. centres. Stand Celotex Boards between studs, upright and loose, with 4 in. lap at perpendicular edges. Fix either Celotex Lath or Boards as a plaster base; plaster both sides of partition with 1/2 in. coat hardwall plaster.

D24 (c).—Double tile partition. Set on pad of Celotex, width of wall; in 1 in. space between double row of tile stand Celotex Boards upright and loose with 4 in. lap at perpendicular edges, between tile, 1/2 in. plaster on both sides of tile.



**D24. INTERIOR LININGS—SOUND-QUIETING—WALLS:** There are many factors that determine the effectiveness of partitions in excluding the passage of sound from one room to another.

Here are the results of careful scientific sound transmission tests conducted by Dr. Paul Sabine, of Riverbank Laboratory:—

	Average Reduction Factor,	Weight per Sq. Ft.
4 in. x 2 in. studs, wood lath both sides, plastered . . . .	2.73	18 lbs.
4 in. x 2 in. studs, Celotex on both sides, plastered . . . .	3.02	11.5 lbs.
4 in. x 2 in. staggered studs, Celotex on both sides, plastered, see Drawing D24 (a) . . . .	3.42	12.8 lbs.
2 in. x 2 in. studs, two rows, Celotex on both sides, plastered, Celotex between 2 in. x 2 in., see Drawing D24 (b) . . . .	4.32	12.2 lbs.
3 in. gypsum tile, two rows, plastered, Celotex in between tile, see Drawing D24 (c) . . . .	3.90	29.8 lbs.
3 in. gypsum tile, both sides plastered . . . . .	3.28	25.4 lbs.
4 in. hollow clay tile, both sides plastered . . . . .	3.36	27 lbs.

A wall of 4 in. x 2 in. studs with Celotex on both sides, plastered, stops sound better than a lath and plaster wall. Again, Drawings D24 (a), (b) and (c) are better sound resisters than any type of wall shown in above tests (without Celotex), including gypsum and clay tile, both considered satisfactory as to sound resistance.

Drawing D24 (b) gave higher sound insulation than any other light-weight partition ever tested. Partition walls of high sound-quieting value require weight, therefore, while Celotex walls without plaster are undoubtedly superior to most materials, a plastered Celotex wall, as illustrated in Drawings D24 (a), (b) and (c), give the best results.

## SECTION E—DECORATIVE TREATMENTS OVER CELOTEX

**E1. DECORATIVE TREATMENTS—EXTERIOR WALLS:** When Celotex is exposed to the weather, then, like timber, it should be primed or glue sized and given two coats of an approved exterior paint, preferably lead and oil paint or varnish, as directed in E4, E5 and E7. When Celotex is to be used as a base for Plastic Paint, fix Boards and reinforce joints and corners with galvanized flywire, as directed in E10.

**E2. DECORATIVE TREATMENTS—INTERIOR WALLS AND CEILINGS:** The natural texture and pleasing tan colour of Celotex is both decorative and artistic. While Celotex may easily be stained, stencilled, distempered, painted, varnished, plastic painted, wallpapered or plastered, it should be remembered that if the surface of the Board is covered with any decorative treatment or covering (except a colour soluble in water, alcohol or benzol) it partially destroys the sound-absorbing value of the side treated. Sound absorption is one of the outstanding qualities of Celotex. Think twice before covering Celotex with a decorative treatment (except as indicated in E8). Try the Board in its natural finish; it can always be decorated later. Leaving Celotex in its natural finish saves the cost of a decorative treatment and preserves its valuable sound-quieting properties. Consider carefully before sacrificing the comfort of quietness that can only be fully enjoyed within a room lined with Celotex in its natural finish, stencilled or stained. Acousti-Celotex is an exception; painting does not impair its sound absorption, see E18 and Section F.

**E3. DECORATIVE TREATMENTS—PRIMER:** Mix one-third turpentine, one-third boiled linseed oil and one-third paint (of the colour to be used) as a primer; or any thick waterproof paint, to which a "drier" has been added, may be used; also any approved ready mixed primer.

**E4. DECORATIVE TREATMENTS—GLUE SIZE:** Dissolve two pounds of ground glue in one gallon (10 lbs.) of hot water, and apply while warm. Use no size that has been mixed over eight hours. Any approved ready mixed size, full strength, may be used. Apply swiftly and evenly with a brush.

**E5. DECORATIVE TREATMENTS—PAINTING:** Over primed (or glue sized) Celotex, any paint may be used and any paint effects produced. NOTE.—To secure maximum coverage where oil paints or decorative coats containing oil are used, the surface of Celotex requires priming or glue sizing.

**E6. DECORATIVE TREATMENTS—DISTEMPER—KALSO-MINE:** Cold water paints may be applied direct over unsized Celotex by mixing a pint of (freshly mixed) glue size with each gallon of cold water paint.

**E7. DECORATIVE TREATMENTS—VARNISH:** Apply direct to Celotex (without sizing), being careful to select the kind of varnish (exterior or interior) for the purpose required.

**E8. DECORATIVE TREATMENTS—STAINS:** Commercial stains, used for dyeing wood, that are soluble in alcohol, benzol or water, are recommended, because they may be applied direct to Celotex without sizing and without decreasing its sound-absorbing value. If the sound-absorbing value is not required, any oil stain may be used, provided the Board is first glue sized before applying the oil stain. Aniline dyes (see E14) that are soluble in water or alcohol may also be used; they are economical and fairly resistant to fading when not exposed to strong sunlight. A colour lighter than the natural colour of Celotex cannot be secured with an aniline dye.

**E9. DECORATIVE TREATMENTS—STENCILLING:** Any stencil design in one or more colours may be applied over Celotex either before or after the Board has been sized. Paint, stains, dyes, Fresco or Japan colours, may be used for

stencilling. Time and expense can often be saved by stencilling designs over Celotex cover strips or panels before fixing.

**E10. DECORATIVE TREATMENTS—PLASTIC PAINT:** For Exterior Walls prepare joints and angles as directed in A10. Exercise extreme care in selecting an exterior plastic paint, one known to be satisfactory; formula given in E12 can be recommended. Prepare Interior Walls and Ceilings as directed in D18. Inspect nailing, wire stripping, and see that all surfaces to be painted are level. If the plastic paint to be used contains oil, glue size before applying. Using a wide brush, spread plastic paint sufficiently thick to completely cover the texture of Celotex and the wire stripping. Plastic paint must be applied with a coat thick enough so that wired joints and angles will not pattern through. Before the plastic paint sets, work in any texture desired.

Most plastic paints are a greyish white; if a continuous uniform colour is desired, the colour pigment may be added to the paint. No further painting is then necessary. If, however, variations in shading (high lights) are desired for interior work, and no instructions have been provided by the plastic paint manufacturer, this may be done by glue sizing, painting the surface with white lead and oil, and then applying the glazing coat. One part of boiled linseed oil and two parts of turpentine well mixed with colour makes a satisfactory glaze. High lights are best produced by going over the freshly glazed surface with a cloth moistened with turpentine. A plastic paint mixed with lead and oil (see E12 for formula) is particularly recommended for Exterior Walls, but may also be used on interior work. It covers about six sq. yards per gallon, based on a paint coat equal in thickness to two ordinary coats of lead and oil paint. Commercial plastic paint, supplied in a dry powdered form to be mixed with warm or cold water, may only be used on interior walls and ceilings. It requires from one to two pounds of this dry powdered paint to cover a square yard, depending on the thickness applied, which, again, depends upon the depth of texturing desired. Metropolitan Plastic Paint (see E13 for formula) is suitable only for interior walls and ceilings; also (when mixed thick) as a cement for fixing interior wire stripping. This inexpensive plastic paint is recommended for use in localities where commercial plastic paints are not obtainable.

**E11. DECORATIVE TREATMENTS—SWEDISH PUTTY FORMULA:—**

15 lbs. dry whiting, sifted.  
1 gallon glue size (1 lb. glue to gallon—10 lbs.—hot water).  
1 pint oil paint, light in colour (20 oz. pint).  
1 pint varnish.

If too thin, add whiting to obtain a thick putty-like consistency. This quantity will cement 120 to 125 lineal feet of 4 in. wire. Swedish putty is to be used only for fixing galvanized flywire over joints and angles.

**E12. DECORATIVE TREATMENTS—PLASTIC (WHITE LEAD AND OIL) PAINT FORMULA:—**

100 lbs. white lead (heavy paste).  
22 lbs. dry whiting, sifted.  
10 pints (20 oz. pint) raw linseed (or flattening) oil.  
1 gill drier (5 oz. gill).

For tints, stir in colour-in-oil in exactly the same way as any lead and oil paint is tinted or coloured.

The above ingredients and quantities will prepare about 51 gallons of paint:—

**MIXING:** Break up the 100 lbs. of white lead in the customary way, using half the oil (5 pints) and adding it a little at a time. Then add the gill of drier. In a separate pail mix the 22 lbs. of sifted whiting with the remaining oil (5 pints). Finally mix the white lead mixture with the whiting mixture. The resulting mix will be a paint of fairly heavy consistency, stiffer than ordinary paint, which will stand up well and permit the working of textured effects when applied to the wall with a brush. It will spread easily, and when applied, will remain workable for approximately one hour.

**APPLYING:** Always glue size Celotex before applying this formula. Only one coat of the plastic paint is necessary, but apply thick enough so that wired joints and angles will not pattern through. Use a full brush and apply the mixture thick. See that it is put on smoothly, but do not attempt to brush it out too far. A coating about equal in thickness to two coats of ordinary paint is heavy enough for a light textured finish. For a heavier texture apply a thicker coat. Work in any texture desired while plastic.

**E13. DECORATIVE TREATMENTS—METROPOLITAN PLASTIC PAINT FORMULA:—**

20 lbs. plaster of Paris, sifted.  
1 gallon glue size—1 lb. glue to gallon (10 lbs.) hot water.

Add only sufficient water to give mixture consistency of soft butter. Then add one pint (20 oz. pint) boiled linseed oil and mix. Do not mix a larger batch at one time than can be applied in a half hour; vary size of each batch mixed according to the number of painters working. It is not necessary to glue size Celotex before applying Metropolitan Plastic Paint. Above formula will cover about eight square yards, depending on thickness of coat and depth of texture. This formula mixed thick to the consistency of putty may be used as a wire stripping cement for interior work. Add plaster of Paris to thicken.

**E14. DECORATIVE TREATMENTS—ANILINE DYE:** Use a reliable brand known to be soluble in water. A 1 per cent. solution (1½ ounces dye to 1 gallon—10 lbs.—of hot water) usually gives a deep enough shade of the colour required. One gallon of a 1 per cent. solution will cover 100 square feet of Celotex with one coat. For a lighter shade, add a measured quantity of water. Keep a careful record of the quantity added so that the same shade may be secured in future. Try out different shades or depths of colour on pieces of Celotex so that colour schemes may be actually visualised before beginning work. Extreme care should be exercised in weighing, measuring and mixing each batch of dye so as to ensure a uniform colour or shade for the entire job. Use a spray gun for economical application; brushing by hand is quite satisfactory.

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**E15. DECORATIVE TREATMENTS—PAINTING CELOTEX FARM BUILDINGS:** Mix equal parts of Portland cement and clean fine sand (sand reasonably dry) with skim milk (instead of water) to a medium-thick brushing consistency. Two coats should be applied. Keep mixture thoroughly stirred while painting. Make fresh mixture for each hour's painting. Recommended for exterior and interior of farm buildings; Celotex surfaces of poultry houses should always be painted.

**E16. DECORATIVE TREATMENTS—WHITEWASH:** The following formula has been found satisfactory. It is white, does not rub or chalk and is quite weather-resistant. It is recommended as the best and most practical formula for exteriors of farm buildings and interiors of any building where whitewash is required.

**FORMULA—**Soak 5 pounds of casein in about 1½ gallons of water (10 lbs. to gallon), preferably hot, until thoroughly softened (about 2 hours). Dissolve 3 pounds of trisodium phosphate in about 2 gallons of water (10 lbs. to gallon) and add this solution to the casein. Allow this mixture to dissolve. Prepare a thick cream by mixing 50 pounds (1 sack) of hydrated lime in about 5½ gallons of water (10 lbs. to gallon), stirring vigorously. Dissolve 2½ pints of formaldehyde in about 2½ gallons of water (10 lbs. to gallon). When the lime paste and the casein solution are both thoroughly cool, slowly add the casein solution to the lime, stirring constantly. Just before using, slowly add the formaldehyde to the batch, stirring constantly and vigorously. Care must be taken not to add the formaldehyde too rapidly, as that may cause the casein to jell, thus spoiling the batch.

**CAUTION—**Do not make up more of this formula than can be used in one day.

Cold lime paste may be substituted for the hydrated lime, if desired; carefully slake and screen 38 pounds (½ bushel) of quicklime. Zinc sulphate may be substituted for the formaldehyde; add in the proportion of ½ pound zinc sulphate to every 50 pounds of hydrated lime used; mix with lime. When casein is not obtainable, skim milk may be substituted for the casein and water. It is not as effective, but will produce a much better whitewash than if the casein were omitted. For a cheaper whitewash the casein and water may be replaced with skim milk. Whitewash or cold water paint will weigh on an average about 15 pounds to the gallon (English liquid measure). A gallon should have the following covering capacity:—On Celotex or wood, about 280 sq. ft. (10 ft. x 28 ft.); on brick, about 225 sq. ft. (10 ft. x 22½ ft.); on plaster, about 340 sq. ft. (10 ft. x 34 ft.).

**E17. DECORATIVE TREATMENTS—WALLPAPER OVER CELOTEX:** Prepare wall and ceiling surfaces as directed in D18 and D20. Inspect carefully: see that entire surface to be papered is smooth and level, particularly wired joints and angles. Glue size Celotex and hang wallpaper in the usual way. Papers with a bold pattern are recommended over Celotex. For thin or light coloured wallpaper, first apply heavy lining paper or a 1/16th in. setting coat of plaster to prevent texture and colour of Celotex showing through. When Board joints are covered with cover battens or fibre stripping, narrow borders of wallpaper may be used to frame panels.

**E18. DECORATIVE TREATMENTS—ACOUSTI-CELOTEX:** Any paint may be used or any paint effect produced on Acousti-Celotex without impairing its sound-absorbing efficiency so long as the holes are not closed over. When an oil paint is to be used, glue size before painting. Acousti tile may be effectively stencilled in one or more colours. Painting or stencilling is preferably done before fixing; it is much easier done than when fixed on wall or ceiling; more accurate, saves time and expense.

## SECTION F—ACOUSTI-CELOTEX

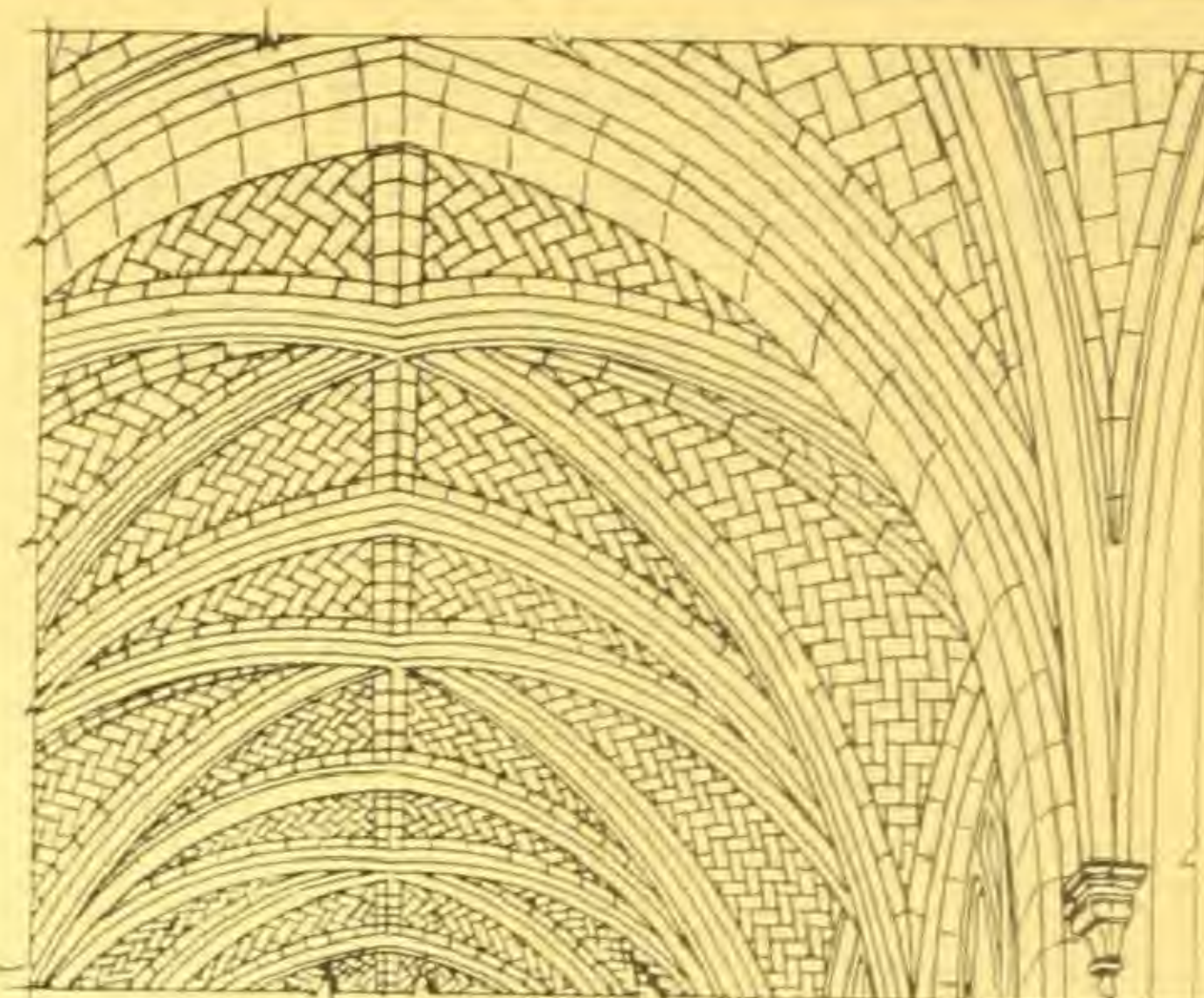
Specifications for fixing Acousti-Celotex must necessarily be general, because each installation usually has details that require special mention, treatment or handling. With the following information, however, the Architect, Engineer, Contractor, or whoever must assume the responsibility for its permanent installation, should have no difficulty in preparing proper and adequate specifications and instructions.

**F1. ACOUSTI-CELOTEX—WORKING DRAWINGS:** Ceiling and/or wall area should be carefully laid out in working drawings, showing surface to be covered and tile pattern or design, bases for nailing and/or cementing, together with all other details. Leave nothing to the option of the workman. When the job is ready for fixing, it is also advisable to lay out the work on wall and/or ceiling in crayon; show accurately the surfaces to be treated, mark centre lines both ways for each space or panel, and starting position of first tile (viz., straddling one or both centre lines alongside of one or both centre lines). Give instructions to begin fixing from centre, continuing out to edges. Laying out the job properly and maintaining true lines during application are absolutely essential to the good appearance of the finished installation.

**F2. ACOUSTI-CELOTEX—NAILING BASE:** All nailing surfaces or bases (wood linings, nailing strips, masonry construction or plaster) must be level. Acousti-Celotex in tile form accentuates any irregularities of the base over which it is fixed. It is important that the preparation of a level nailing base be given due care. Nailing bases for curved surfaces must be symmetrically level.

**F3. ACOUSTI-CELOTEX—PATTERNS—PANELS—BORDERS:** Over large level areas, where the entire surface is to be covered, any one or all three sizes of Acousti-Celotex may be used and fixed in any one or any combination of patterns such as square, diamond, basket-weave, herring-bone, or broken joint, with or without a border at edges or around columns. See Drawing F3 for Ashlar pattern.

Where surfaces are divided into panels, by beams or wall columns, any pattern may be used to cover all or part of the surface, either with or without a border. When only a portion of the surface is to be covered, a large central panel or a



DRAWING F4.

All types and sizes of Acousti-Celotex when kerfed are easily fixed over arches, groined ceilings or double curvature surfaces.

series of small panels may be fixed, in any size or pattern desired. Celotex Standard Building Board may be used to fill in spaces between panels; or a wood, Celotex or plaster moulding may be used around or to frame Acousti panels, to break the change in depth from the existing surface or face, to the face of the Acousti-Celotex. For borders, any size or thickness of Acousti-Celotex or Celotex Standard Building Board may be used. When Celotex is used, double or triple-thick Board (sanded one side) is recommended, to match thickness of Acousti-Celotex used; however, a border or field of the same thickness is not always necessary. Celotex may also be used as a field around panels and to permit using panels of Acousti-Celotex in even feet. For instance, take a panel 4 ft. 6 in. x 10 ft. 8 in.; the Acousti-Celotex panel might be 3 ft. x 9 ft. with a 9 in. and 10 in. border of Celotex. Corner angles (exterior or interior) formed by Acousti tile at ceilings, walls, beams or columns are finished with mitred joints or by covering the exposed edges of Acousti-Celotex (that may be on one or both sides of the corner angles) with a moulding of wood, plaster or Celotex. Indicate procedure on working drawings; don't wait until the job starts.

**F4. ACOUSTI-CELOTEX—CURVED SURFACES:** For coves or curved surfaces with a radius of less than 8 ft., it is advisable to kerf each tile across its back with one or more saw cuts, about 3/16th in. deep, so that each Acousti tile may accommodate itself to the required curvature. In the layout of double curvature surfaces, divide them into equal sections, by radial ribs of Acousti-Celotex; a crayon line down the centre of each sector marking the start for fixing, working out to the radial ribs. A herring-bone pattern is recommended for the field, using 12 in. x 6 in. tile for both radial ribs and field. This procedure also applies to domes and double-curved groined ceilings.

**F5. ACOUSTI-CELOTEX—NAILING:** Nails used should be galvanized, "cement coated" (dipped in rosin), copper or lead-coated. Nail heads should never be larger than 3/16th in. so as to fit easily into corner holes without tearing or marring the surface while driving and punching in.

Over wood nailing strips use a 12 in. or 2 in. nail for Type BB Acousti-Celotex; a 1½ in. nail for Type B; and a 1 in. nail for Type C. Two holes at each corner of Types B and BB are drilled shallow to provide a firm nail hold; also there are two shallow holes midway between corners on 24 in. edge of 24 in. x 12 in. tile. For fixing Types BB and B Acousti-Celotex to nailing strips or wood nailing base, toe-nail each exposed edge, starting nail below the bevelled edge so as to set the edges snugly against tile already fixed. At all shallow corner holes use one nail (two if necessary). Toe-nail each exposed 24 in. edge of 24 in. x 12 in. tile, with two or more nails; also use one nail (two if necessary) in the shallow holes midway between corners on both 24 in. edges. Use a nail punch with flat head and straight shank not more than 3/16th in. in diameter to seat nails firmly in holes. Do not use a tapered nail set which might easily mar or enlarge holes, causing an unsightly appearance.

**F6. ACOUSTI-CELOTEX—TIMBER CONSTRUCTION—UNPLASTERED:** Nail Acousti tile directly to the existing lining when possible. Give attention to discoloration due to air currents (see F10). In the absence of a firm level nailing base, fix 3 in. x 1 in. nailing strips, spaced to fit size of Acousti tile selected, over studs, joists, rafters, or other supporting framework, provided these supports are spaced on not more than 30 in. centres; for greater distances provide level framing of proper size and strength, on not more than 30 in. centres, that will amply support both 3 in. x 1 in. nailing strips and Acousti tile. Select for nailing strips well-seasoned fir, cypress or other suitable timber not given to warping or twisting and that nailing will not split. Fix nailing strips on 6 in. or 12 in. centres, spaced to fit size of Acousti-Celotex tile selected, arranged for the required design or pattern and to provide a firm nailing base. Nail tile as directed. See Drawings at end of this Section.



**F7. ACOUSTI-CELOTEX — MASONRY CONSTRUCTION — UNPLASTERED:** (CEILINGS: concrete—beamed concrete—tile and concrete. WALLS: concrete—brick—stone—gypsum or clay tile.) The application of Acousti-Celotex directly to these surfaces cannot be recommended because a suitable cementing mixture has not been found that under all conditions can be used without nailing; it is usually difficult or impossible to nail into masonry construction so as to hold Acousti-Celotex while the cementing mixture sets. Wood sleepers fixed to masonry surfaces with 3 in. x 1 in. nailing strips across them is usually the easiest method of providing a nailing base.

In new concrete construction, 3 in. x 1 in. chamfered sleepers or not more than 30 in. centres may be placed in forms before pouring concrete; or metal clips, not more than 36 in. apart, lined and spaced on 30 in. centres, may be used for fastening 3 in. x 1 in. sleepers. In existing concrete construction, 3 in. x 1 in. sleepers may be fastened on not more than 30 in. centres with expansion bolts, drive-ins, rawlplugs, or drilling and plugging, fastening not more than 30 in. apart; across sleepers or furring, 3 in. x 1 in. nailing strips are securely fixed. Over brick and stone construction it is sometimes possible to nail 3 in. x 1 in. nailing strips to mortar joints, but wood plugging, expansion bolts, drive-ins, or rawlplugs can always be used for fixing, when necessary. See Drawings at end of this Section.

Space nailing strips on 6 in. or 12 in. centres to accommodate the pattern of Acousti tile selected. Over gypsum tile that is level and fairly smooth, Acousti tile may be directly nailed. Nail Acousti tile as directed in F5. See F10 for discoloration.

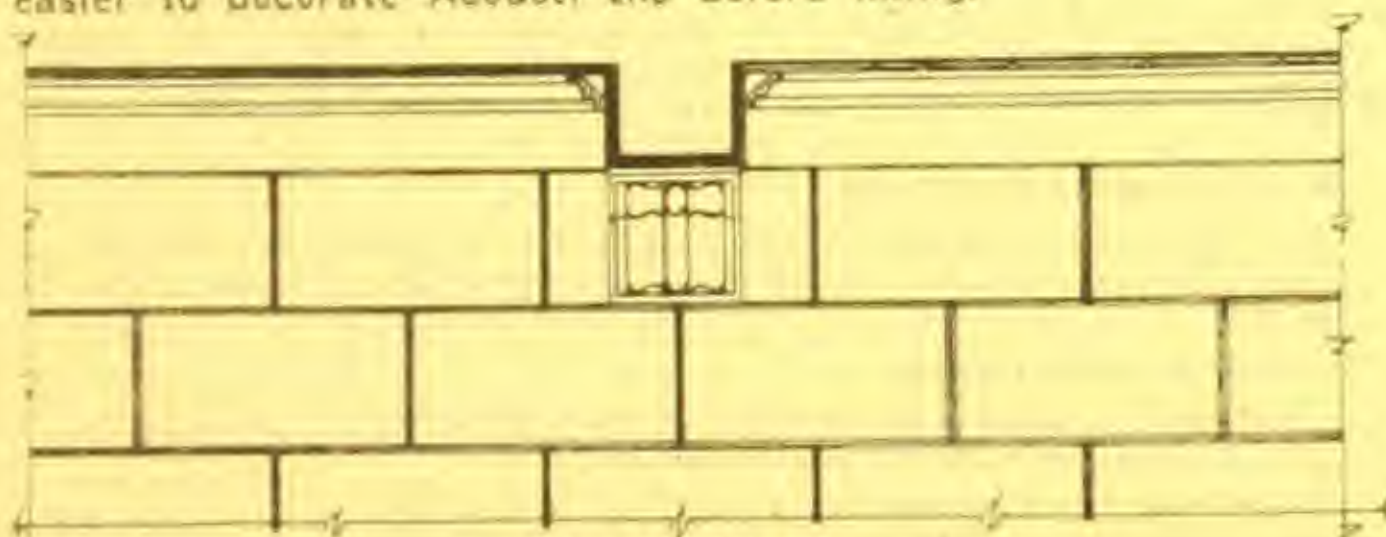
**F8. ACOUSTI-CELOTEX — PLASTERED SURFACES — MASONRY OR TIMBER CONSTRUCTION:** When the plaster is strong enough to provide a grip for the nail and to withstand the shock of nailing, Acousti tiles are fixed by using an approved waterproof cement, buttering back of tile with a dab of cement near each corner, working cement well into tile with buttering knife; press tile into place against plaster and hold in place by nailing as directed in F5. Nailing is necessary to hold Acousti tile in place until the cement sets and as an added factor of safety in case the cement bond with the plaster fails for any reason. Before fixing inspect plastered surfaces for loose or blistered oil paint or kalsomine (distemper); scrape loose or blistered paint surfaces and thoroughly wash off kalsomine, otherwise the bond between the cement and plaster will only be as strong as the paint or kalsomine. For plastered concrete, brick, stone, metal lath, clay or gypsum tile ceilings or walls, experience indicates that only hardwall (gypsum) and Portland cement plastered ceiling surfaces provide a satisfactory nailing base; for walls, any plaster that is strong and FIRMLY BONDED will be found acceptable for cementing and nailing; this is also true for ceilings when plastered over wood lath.

Over wood linings, or over wood lath and plaster, fix Acousti-Celotex by nailing directly to the lining or through to the wood lath. The plaster, however, should in all cases be carefully inspected and tested by driving nails at several places before starting work. When there is evidence of a roof leak (old or new) inspect carefully, making sure plaster has not been weakened or loosened. When the plaster is very weak or in extremely bad condition, it may be necessary to remove it entirely before fixing furring or nailing strips. In either masonry or timber construction, plaster that is less than 3 in. thick, loose, weak, not firmly bonded, or that may be loosened by nailing, should have 3 in. x 1 in. nailing strips fixed over the plaster as directed in F6 and F7.

**F9. ACOUSTI-CELOTEX — SHEET METAL SURFACES:** (1) When timber framing, over which sheet metal is fixed, is properly spaced, fix Acousti tile directly over metal, nailing through to framing; or (2) fix 3 in. x 1 in. nailing strips over the sheet metal where existing framing is not properly spaced; or (3) remove sheet metal and fix nailing base spaced to fit Acousti-Celotex tile.

**F10. ACOUSTI-CELOTEX — AIR CURRENT DISCOLORATION:** When tiles are not fixed directly over backing, such as plaster or wood lining, careful consideration should be given to air infiltration (due to temperature changes) between tile and also through the holes in Type C tiles. Without a continuous backing, any passage of air between tiles or through holes in Type C tile will result, in time, in discoloring the tile at the edges (and also the holes in Type C)—due to dust being deposited by air currents. Provide a continuous backing by covering nailing strips (before fixing tile) with an unsaturated felt, building or roofing paper, weighing at least 50 lbs. per 100 sq. ft. This will effectively stop discoloration from dust deposits caused by air currents set in motion by temperature changes.

**F11. ACOUSTI-CELOTEX — PAINTABILITY:** So long as holes are not closed or filled over, painting does not impair the sound-absorbing efficiency of Acousti-Celotex. The paintability of Acousti-Celotex is one of its outstanding qualities. Glue size before applying paints mixed with oil. Paint, or any stencil design in one or more colours, may be applied either before or after fixing, see Section E. It is usually much easier to decorate Acousti tile before fixing.



DRAWING F3

Aslilar wall pattern fitted around beam with 24 in. x 12 in. Acousti-Celotex tile.

**F12. ACOUSTI-CELOTEX — SIZES — ABSORPTION COEFFICIENTS, ETC.: TYPE BB:** Sound Absorption Coefficient .70. Sizes 12 in. x 6 in., 12 in. x 12 in., and 24 in. x 12 in. Thickness 1 1/4 in. Weight per square foot 1 lb. 10 ozs. Packed respectively 184, 92 and 46 tiles per crate.

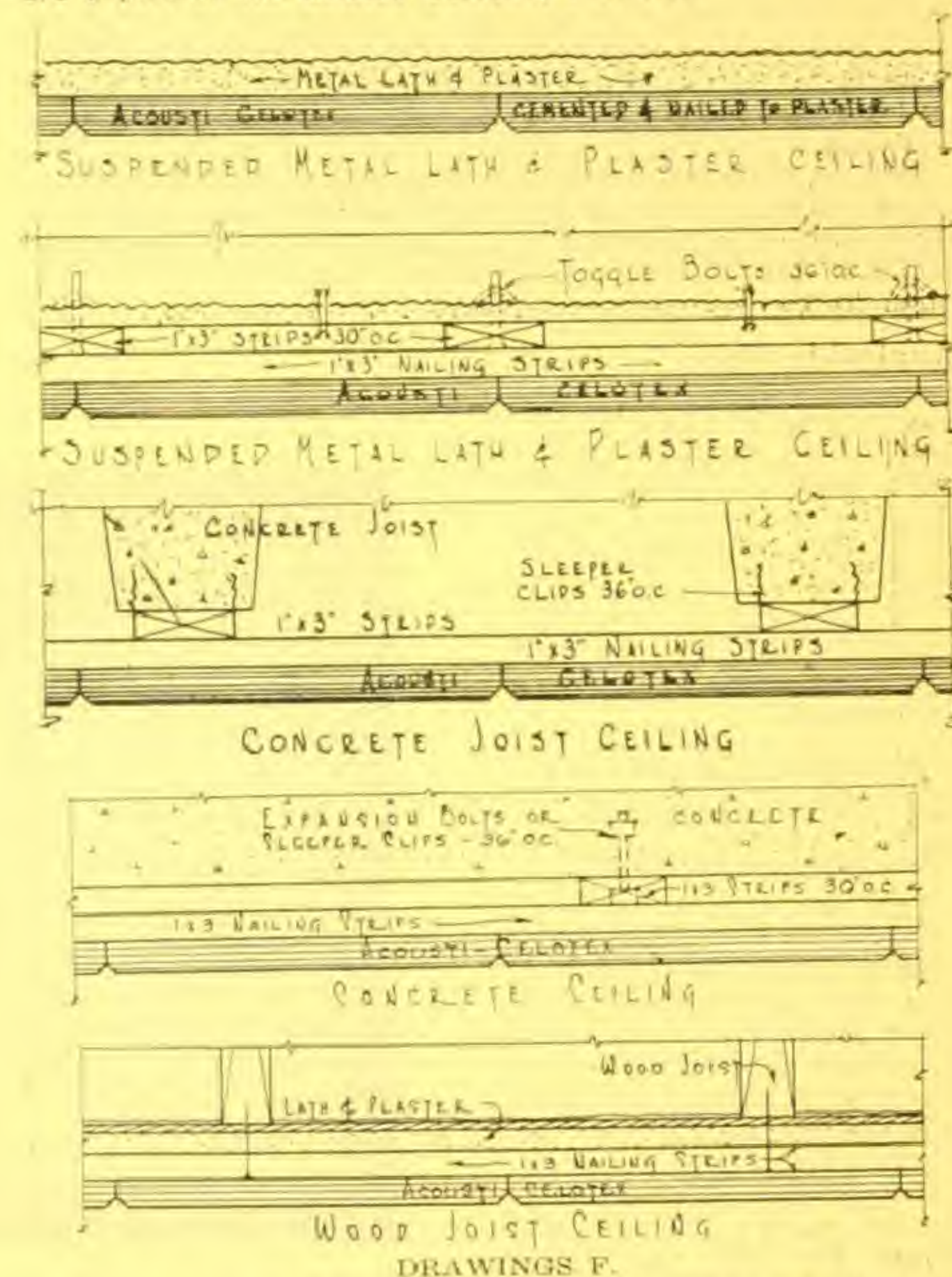
**TYPE B:** Sound Absorption Coefficient .47. Sizes 12 in. x 6 in., 12 in. x 12 in., and 24 in. x 12 in. Thickness 13/16th in. Weight per square foot 1 lb. 3 ozs. Packed respectively 272, 136 and 68 tiles per crate.

**TYPE C:** Sound Absorption Coefficient .30. Size 12 in. x 12 in. Weight per square foot 8 ozs. Packed 292 tiles per crate. Shipping weight, all Types, crated, approximately 220 lbs. per crate. The sound-absorbing values of Acousti-Celotex are based upon the standard frequency of 512 vibrations per second (a tone one octave above middle C).

All Acousti-Celotex tiles are drilled with 441 holes (1/4 inch diameter) per square foot. All Types may be ordered with bevelled, unbevelled, or trimmed edges. Bevelled edges are always supplied unless unbevelled or trimmed edges are specified.

Trimmed edges reduce size of 12 in. x 6 in. tile to 11 5/32nd in. x 5 5/16th in.; 12 in. x 12 in. tile to 11 5/32nd in. x 11 5/32nd in.; and 24 in. x 12 in. to 23 1/2 in. x 11 5/32nd in. Trimmed edge tiles are used to provide a uniform spacing of the holes over any given surface and to eliminate the tile effect. Note that more trimmed edge tiles must be ordered to cover a given area.

The Acoustical Division of the Celotex Company maintains a free service for architects, engineers and builders. This includes a scientific analysis of the acoustical conditions of either existing interiors, or of rooms not yet built. Submit blueprints of floor, transverse and longitudinal sections, and ceiling plan, with details of all exposed linings, floor walls and ceiling; seats and seating capacity; average size of audience for which correction is to be made; also what used for (office, music, speaking or "talkies"). Complete recommendations for satisfactory acoustical correction or sound-quieting treatments are a part of the Celotex Company's service.

DRAWINGS F.  
Fixing Acousti-Celotex tile direct to hardwall plaster, or to 3 in. x 1 in. nailing strips.

Your problems in construction involving weight, strength, insulation, acoustical control and sound-quieting (using Celotex for the above purposes or any other) will receive the attention of qualified architects, builders, and engineers specialising in insulation, acoustics and sound-quieting. Send full details of problem with your enquiry to The Celotex Company, G.P.O. Box 3248P, Sydney, N.S.W. There are no charges for this technical advice.

THE CELOTEX COMPANY,  
919 North Michigan Avenue,  
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## TEN/TEST, A DIFFERENT INSULATING BUILDING BOARD

### What Ten-Test Is

Ten-Test is made from the fibres of Canadian spruce specially prepared by a series of exacting processes, and formed into a strong, tough, durable board under a hydraulic pressure of 2,000 tons. It is solid—not laminated. It is produced in a single board of any desirable thickness—not built up layer by layer to meet the required size.

This process provides the best insulation obtainable—no matter what thickness of Ten-Test is used, there is nothing in the board to detract from its insulating qualities.

Briefly, Ten-Test consists of non-heat-conducting and waterproofed spruce fibres surrounding millions of tiny air cells that successfully resist cold, heat and sound. It comes in individually manufactured sheets of the dimensions in the following schedule:—

### Available Sizes

Thickness.	Width, feet.	Length, feet.	Wt.*
7-16	3 or 4		79
3/8	" "		113
1/2	" "	6, 7, 8, 9,	135
1	4	10, 12, 14	180
1 1/2	"	"	270
1 3/4	"	"	315
2	"	"	360

\*Approx. per 100 sq. feet.  
Lengths up to 17 feet can be supplied if desired.

### A New Thought in Building Construction—Measured Insulation

Ten-Test insulation gives the architect and builder a definite standard by which they can determine accurately the exact thickness of insulating board for any job. Thus the number of standard thicknesses (up to 2 in.) in which Ten-Test is made makes it possible to select just the right degree of insulation for any condition, whether for sheeting, floors, roofs, walls or refrigerator insulation. Thus Ten-Test truly offers measured insulation.

### Ten-Test is Not a New Insulating Board

While different from other insulating boards, Ten-Test is not new in the sense of being untried. For twenty years it has been used as insulation for dwellings, industrial plants and public buildings—for sheeting, insulating flooring, roofs and walls. Under all atmospheric conditions, its solid, yet cellular spruce fibre construction has provided the highest degree of insulation, com-



bining plastic bonding qualities with great structural strength.

Ten-Test was selected for the construction of the Canadian Building at the Wembley Exposition. It was used in the Bank of England (both old and new buildings), the Royal and Ancient Golf Club, St. Andrew's, and the King's Reviewing Pavilion at Aldershot, The War Office, the Admiralty and the London

County Council are regularly using Ten-Test in construction work. Ten-Test was also used in the construction of the Royal York Hotel, Toronto, Sun Life Insurance Building, Montreal, Montreal Stadium, Toronto General Hospital, the New Zealand Government Building, and numerous commercial and residential buildings throughout New Zealand, Canada, England, Africa, U.S.A., France, China, Japan and Australia; a brief list of important Australian examples being given on one of the following pages.



TEN-TEST INSULATION THAT IS MEASURED FOR EVERY INSULATION NEED.

### Official Tests

#### I—CONDUCTIVITY.

Ten-Test has a conductivity of 0.324 B.t.u. per hour per sq. ft. per degree Fahr. per 1-in. thick. Authority: Prof. E. A. Allcut, M.Sc., M.I., of the University of Toronto.

#### II—TENSILE STRENGTH.

228 lbs. per sq. in. Tests made on 7-16 in. board cut to strips 1 in. wide and tested in a Riehle Tensile Testing Machine, the grips being 2 in. apart.

#### III—TRANSVERSE STRENGTH.

(Equal deflection) is 28.4 lbs. Tests made on 7-16 in. board, 6 in. wide, 18 in. long on 12 in. centres, and load applied to breaking point.

#### IV—PLASTER BONDING STRENGTH.

1,340 lbs. per sq. ft. Ordinary wood fibre plaster applied to standard 7-16 in. board, and pull registered in an Oslen Testing Machine.

#### V—PORTLAND CEMENT STUCCO BOND

Tests by Canadian Pozzolana Co. Ltd., Toronto—After 2 weeks' set, cement stucco could not be separated from Ten-Test when broken up with a 6-lb. hammer.

#### VI—MOISTURE RESISTANCE

Ten-Test, after complete immersion in water, registered 23.7 increase in weight. The waterproofing in the fibres is responsible for its resistance to moisture.

#### VII—SOUND ABSORPTION.

Co-efficient of absorption of 7-16 in. Ten-Test is .35. Authority: Prof. G. R. Anderson, of the Toronto University.

Note: Authority for Tests Nos. II, III, IV and VI: J. E. Donald & Co. Ltd., Chemical Analysts and Engineers, Montreal, Quebec.

(Continued on next page.)



## TEN-TEST AS EXTERIOR SHEETING AND INTERIOR WALL AND CEILING BOARD

## Ten-Test Will Take Any Exterior or Interior Finish

Stucco, plaster, weatherboards, paint and wood cover strips, brick veneer on the outside and paint, plaster and special finish on the inside, have all been applied to Ten-Test with unvarying success for many years. In addition, it establishes one of the strongest bonds with plaster without the use of metal laths except at joints and corners.

## Ten-Test as Exterior Finish or Sheeting Under Weatherboards, Stucco or Brick Veneer.

Ten-Test is unusually well suited to all sheeting purposes, regardless of what the exterior of the building is to be—brick, stucco, weatherboards, or just paint and wood cover strips. Applied directly to studding, it provides positive insulation against cold, heat and sound, and supplies greater wall strength than ordinary weatherboards afford.

Structural framing for Ten-Test boards should follow the ordinary practice, the studs, joists and rafters being framed in the usual manner. Ten-Test boards should be applied lengthwise, parallel to studs, joists and rafters, directly to the framework, and set in place so as to have a bearing for nailing along all edges. Boards should be tacked in place as closely as possible without crowding.

Plaster and stucco can be applied directly to Ten-Test without the use of metal lath, except at corners or intersections. If metal lath for external work is desirable, Ten-Test sheeting boards should be covered with heavy-weight building paper, and the surface thus formed provided with battens to receive metal lath. If self-furring metal bases are used, the battening is not necessary, the lathing being fixed with staples which pass through Ten-Test into studs.

## Ten-Test as a Wall and Ceiling Board

Ten-Test is an ideal material for use as wall and ceiling board, as its well-sanded finish and well proportioned panels offer a wide range of possibilities for a unique, decorative scheme without additional finishes. In addition, its extraordinary bonding qualities provide a perfect base for any applied finish such as wallpaper, paint, plaster, etc. It will not crack, buckle or warp; it absorbs sound and is vermin-proof.



TEN-TEST INSULATION IN THE QUEEN'S LABORATORY, UNIVERSITY OF MELBOURNE.

## ARCHITECT'S SPECIFICATIONS FOR TEN-TEST SHEETING AND FINISHED WALL BOARD

## (1) Exterior Finish

## STUDDING.

(a) All studding shall be 4 x 2 in. at 18 in. centres; corner and door studs 4 x 4 in. Bracing: 3 x 1 in. let in flush on the outside.

Note.—When 4 ft. wide Ten-Test sheets are used, studding should be at 16 in. centres.

(b) Cut in 4 x 2 in. nogging between studs at horizontal joints of Ten-Test.

## SHEETING.

(c) All exterior sheeting shall be Ten-Test ..... x ..... ft. x ..... in. thick, and used the full size of the board wherever possible.

(d) Apply Ten-Test vertically, with rough side direct to studding, with bearing on all four edges, with spaces of 1/4 in. between adjoining boards. Nail with 1 1/2 in. wire nails spaced 4 in. apart along edges and 6 in. apart along intermediate frame members.

## BATTENS FOR WIRE LATH AND STUCCO.

(e) A layer of heavy-weight waterproof building paper shall be applied over all surfaces of Ten-Test that are to receive metal lathing for stucco.

(f) Over the above paper provide and fix 2 x 1 in. battens set horizontally at 18 in. centres, solidly nailed to each stud. Metal lath will be supplied and fixed to battens by others.

## PROVISION FOR BRICK VENEER.

(g) Provide and install approved metal anchors or wall ties, which are to be staggered, and spaced to suit the brick courses. Anchors or ties shall be nailed through Ten-Test into studs. Allow not less than 1/2 in. space between brick walls and Ten-Test.

## (2) Interior Finished Wall and Ceiling Panelling

## STUDDING.

- (a) Use paragraph (1a)
- (b) Use paragraph (1b)

## BATTENS.

(c) The faces of brick walls shall be battened with 2 x 1 in. battens at 18 in. centres and thoroughly fixed to brickwork.

## CEILING JOISTS.

(d) Specify in the usual manner the sizes of joists and strutting required.

(e) Cut in 4 x 2 in. headers between joists at cross joints of Ten-Test.

## FINISHED WALL AND CEILING PANELLING.

(f) Use paragraph (1c)

(g) Use paragraph (1d) and insert "battens and ceiling joists" after the word "studding."

Note.—Following the above clause the specification writer should create additional clauses covering the scheme of finish or plastering desired. Plastering on standard Ten-Test boards is carried out similar to those suggestions given under the heading of "Ten-Test as a Plaster Base."

## (3) Exterior Finish—Stucco

Note.—Include clauses 1a, b, c, d, in "Carpenter," but make one change in clause (d)—the space between boards should be 1/4 in. instead of 1/2 in.

## STUCCO WORK APPLIED DIRECTLY TO TEN-TEST.

(a) Before first coat of cement stucco is applied, all joints and corners shall be reinforced with metal lath, and the surface of Ten-Test sheeting shall be well wetted and then grouted with a mixture of 3 lbs. Portland cement to one pail of water. The grouted surface shall be moist before applying first coat of stucco.

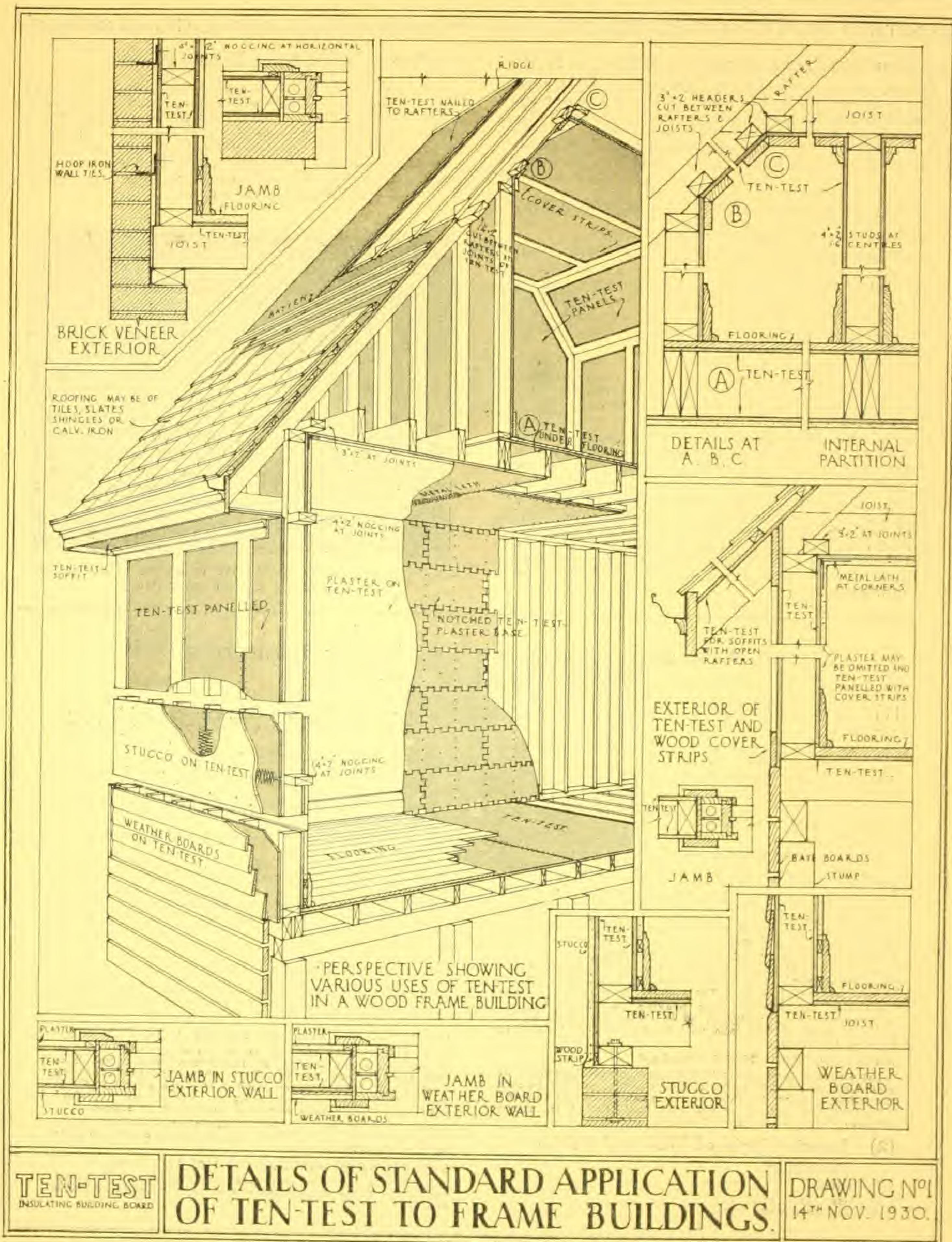
Note.—The remaining specification clauses for Stucco work should follow the above. Any type of stucco desired by architect may be applied to Ten-Test sheeting.

## STUCCO WORK APPLIED TO METAL LATH.

Specify ordinary three-coat work to be applied in the usual manner, or follow manufacturer's specifications for special stucco work.

(Continued on next page)







## TEN-TEST AS ROOF AND FLOOR INSULATION

## As Roof Insulation

Ten-Test meets every requirement as an efficient insulation for roofs. It may be applied over all kinds of wood and concrete decks and under every type of roof covering, such as tiles, slates, shingles and galvanised iron, etc. When so used, Ten-Test saves fuel radiation, prevents condensation, permits the use of smaller heating units, reduces expansion and contraction on concrete roofs, and keeps heat in and cold out in the winter, and the reverse in summer.

## As Floor Insulation

A further and very important use of Ten-Test is its application to all types of floors. It can be applied to wood and concrete floors in any of the methods illustrated on Drawing No. 2. Its presence in the floors provide two distinct advantages.



First, it places insulation where it is sorely needed, as it eliminates all possibility of cold air draughts at the floor level. Second, as

sub-flooring material, it acts as a sound deadener, which absorbs most of the usual noise present in the building.

## As Ceilings

In Commercial Buildings where ceilings of reasonable cost and capable of speedy application, and possessing the properties required for insulation from sound and temperature, prevention of condensation and ability to withstand vibration—a ceiling pleasing in appearance, ready for immediate decoration, whether with plain mill white, elaborate distemper, paint or enamel, are desired, the architect may specify Ten-Test with the greatest of confidence, knowing that it contains all the foregoing qualities.

On Drawing No. 2 there will be found methods of applying Ten-Test ceilings to various types of floor construction.

## ARCHITECT'S SPECIFICATIONS FOR TEN-TEST ROOF INSULATION

## Wood Roof (Flat)

Note.—Specification for "Carpenter" should include roof framing and decking, which should be not less than  $\frac{7}{8}$  in. T. & G.

(a) All flat roofs shall be insulated with two layers of Ten-Test Insulating Board,  $\frac{1}{2}$  in. thick.

(b) The surface of the T. & G. deck shall be broom cleaned, and then the first layer of Ten-Test, rough side down, applied directly to decking. Boards shall be laid without forcing into place and nailed with roofing nails at 6 in. on centres on all four edges  $\frac{1}{2}$  in. from edge in all cases. Centre nailing shall be done first and staggered.

(c) Over the above surface of Ten-Test apply a well-mopped coat of asphalt (30 lbs. to 100 sq. ft.). While asphalt is still hot, place the second layer of Ten-Test, pressing well into place and making sure that no joint in upper layer is over a joint in lower layer.

Note.—At intersection of walls and Ten-Test provide for a wood angle fillet.

Complete specification, including flashing and any type of ready roofing desired.

## Concrete Roof

Note.—Surface of roof is to be left reasonably smooth

(a) All flat concrete roofs shall be insulated with two layers of Ten-Test Insulating Board,  $\frac{1}{2}$  in. thick.

(b) The surface of roofs shall be broom cleaned and given a coat of hot asphalt (30 lbs. to 100 sq. ft.). Apply

first layer of Ten-Test, rough side up, to hot asphalt, pressing firmly into place without forcing at any point. perly.

(c) Cover the first layer with hot asphalt as previously specified, pressing well in place without forcing, and making sure that no joint in upper layer is over a joint in lower layer.

Note.—At intersection of Ten-Test and walls provide for a wood angle fillet.

Complete specification, including flashing and any type of ready roofing desired.

## Wood Roof (Pitched)

## ROOF FRAMING.

(a) All rafters shall be  $\frac{1}{2}$  in. at 18 in. centres. Cut in 4 x 2 in. headers at cross joints of Ten-Test to provide fixing for all four edges.

## INSULATION.

(b) All roofs shall be insulated with Ten-Test Insulating Boards  $\frac{1}{2}$  in. thick. Ten-Test shall be nailed directly to rafters at 4 in. centres,  $\frac{1}{2}$  in. from edge of each board.

Note.—Complete specification, specifying type and size of battens that shall be fixed to Ten-Test to provide fixing for type of finished roof desired, such as tiles, slates, shingles, or galvanised corrugated iron.

## LIST OF IMPORTANT INSTALLATIONS

Prince of Wales Hospital, Randwick, N.S.W.—Architect: Commonwealth Works Department.

St. John's Church, Brunswick, Vic.—Architect: Louis Williams.

Queen's Laboratory, University of Melb.—Architect: Harry A. Norris.

The Chalet, Mt. Kosciuszko—Architect: N.S.W. State Pub. Works Department.

The Lakes Golf Club, Mascot, N.S.W.—Architects: Wright & Apperly.

Benevolent Home, Ballarat, Vic.—Architects: Richards, Coburn & Richards.

Geelong College, Vic.—Architects: Hudson, Wardrop & Usher.

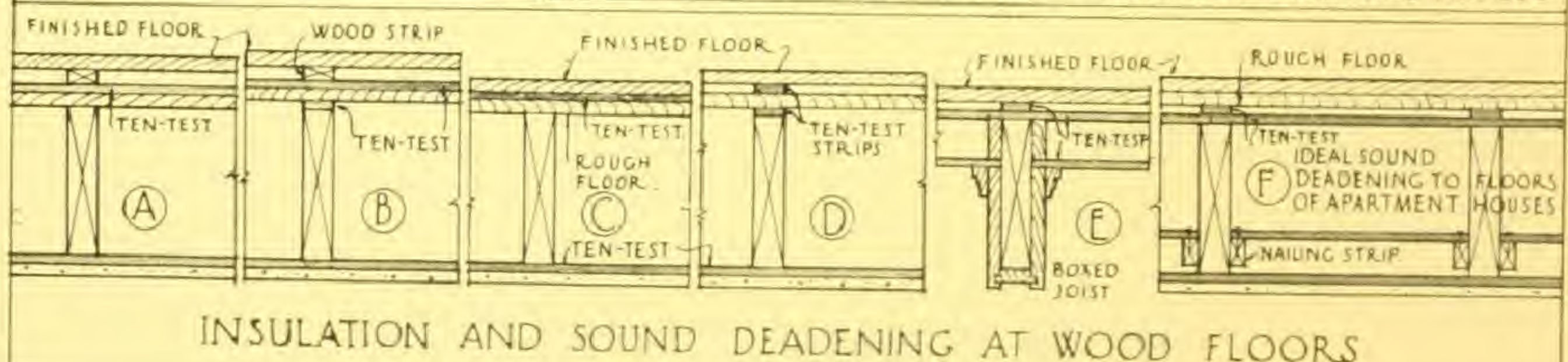
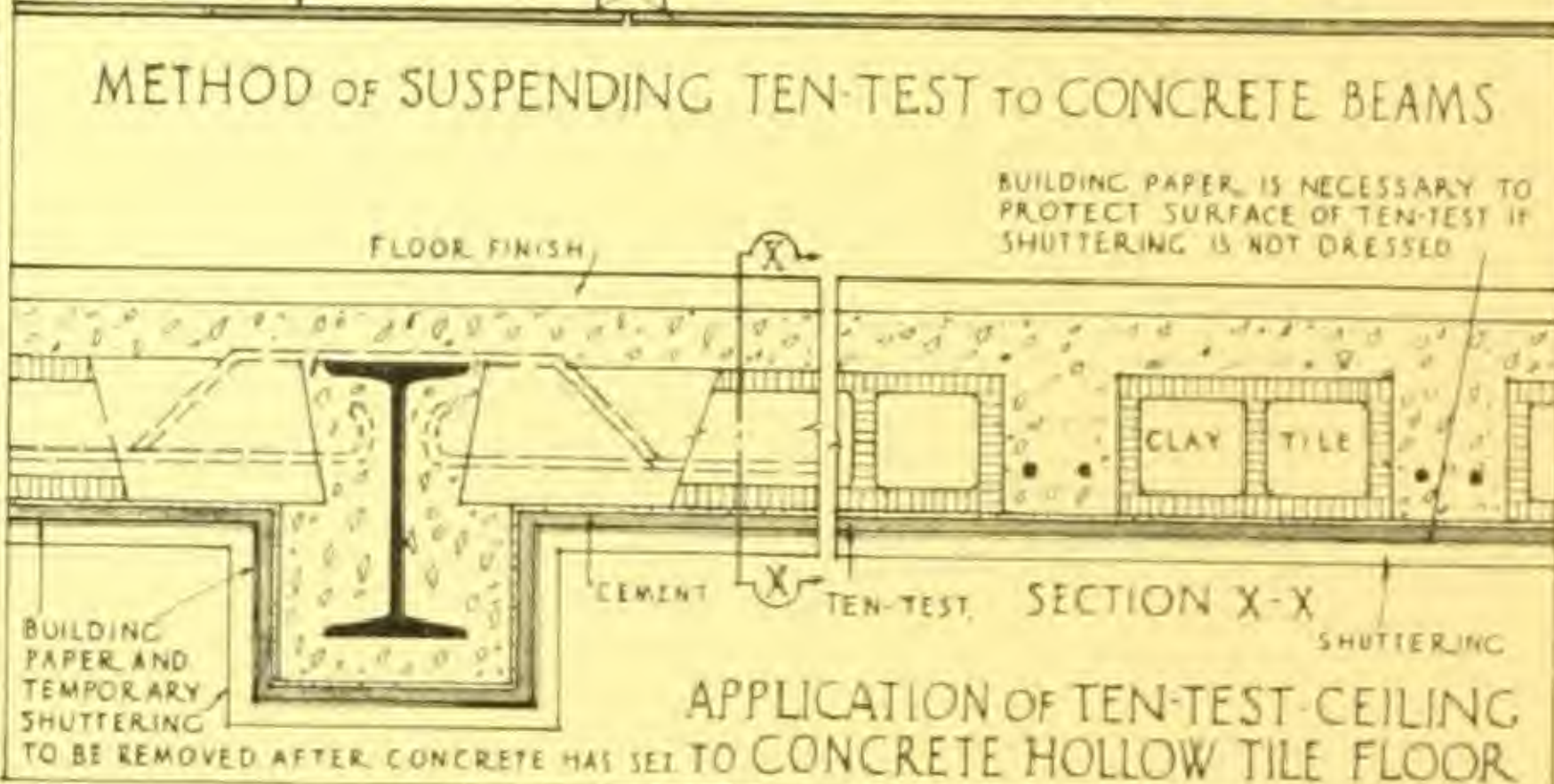
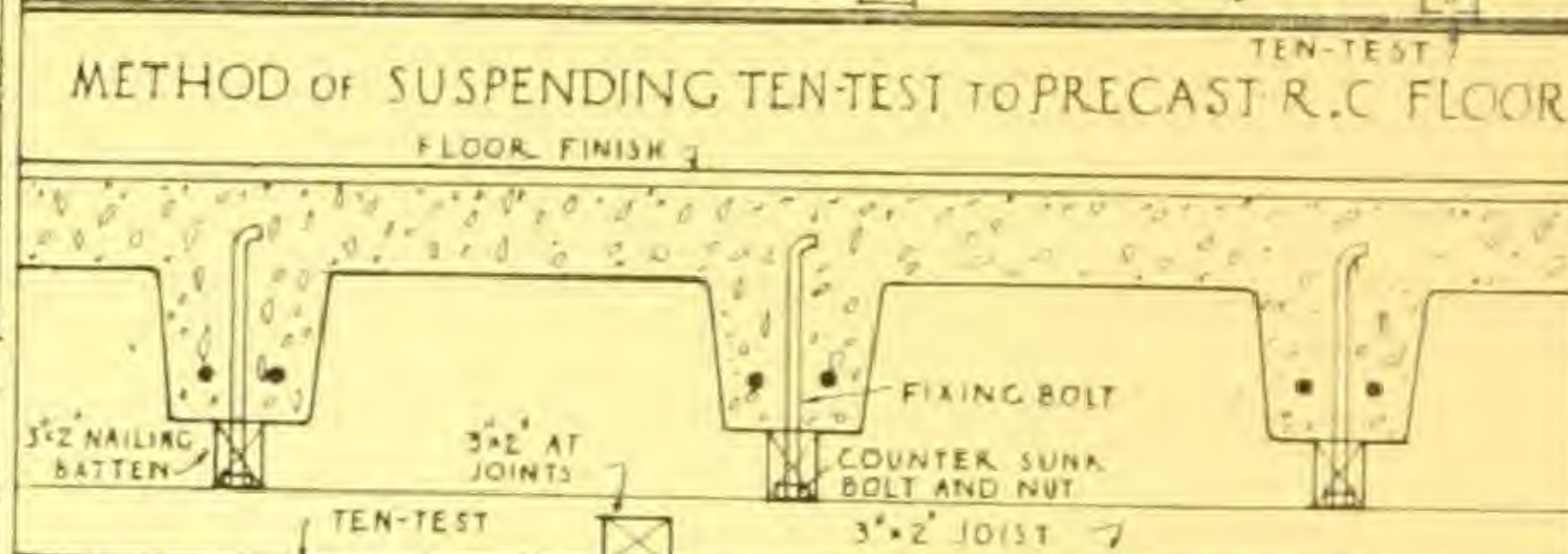
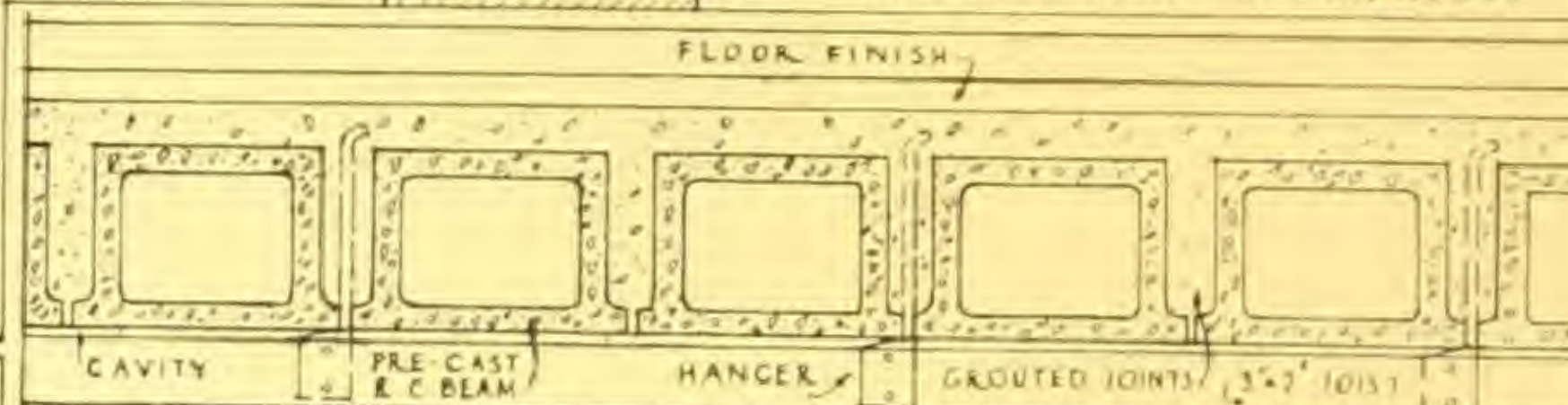
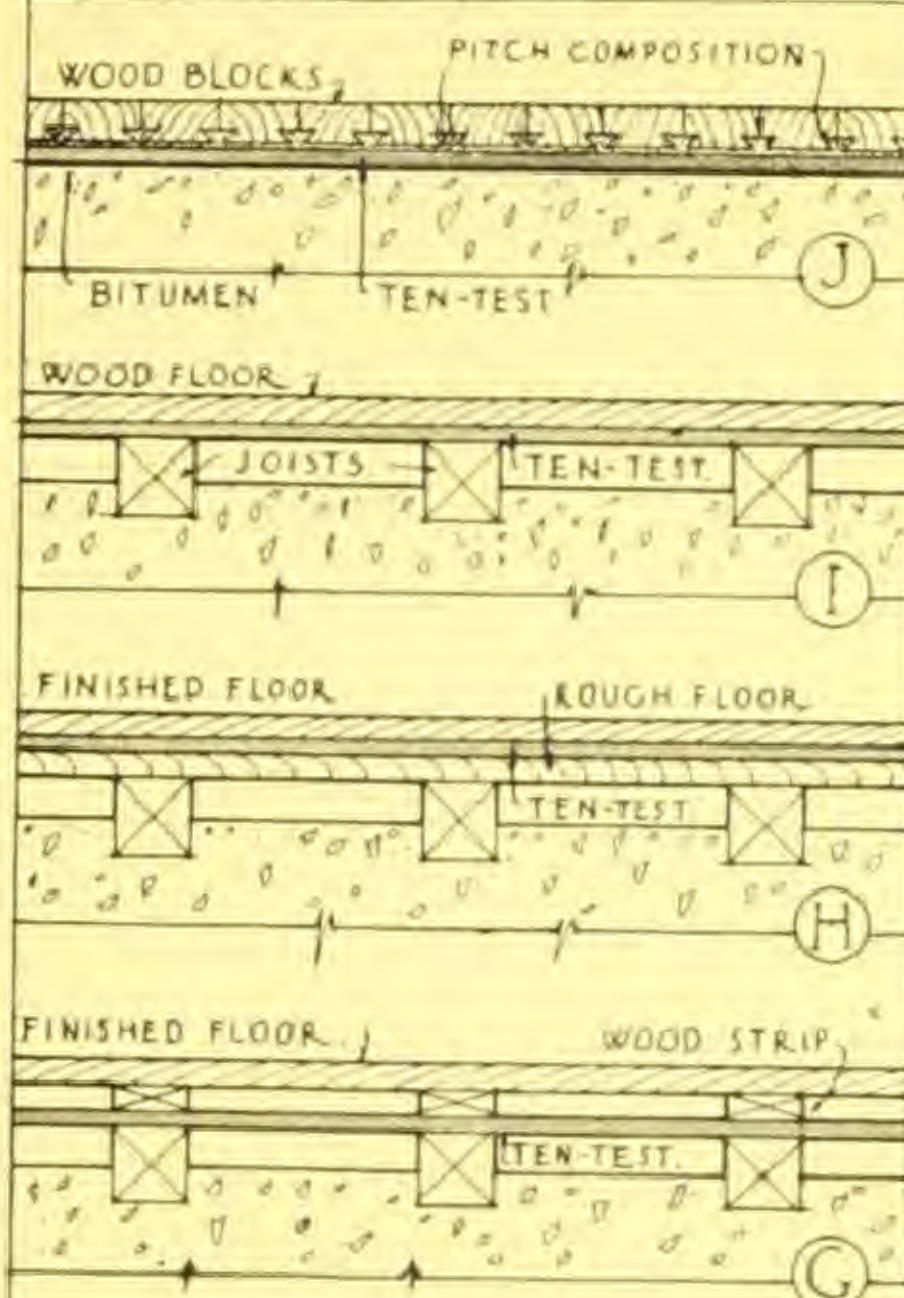
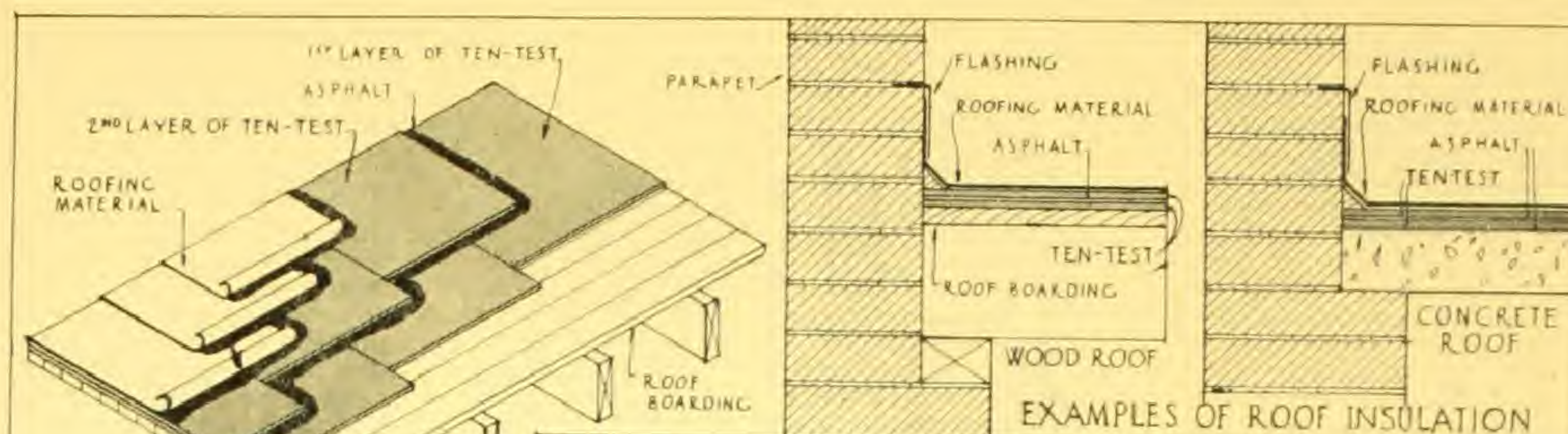
St. Andrew's Cathedral, Sydney—Architects: Burcham, Clamp & Finch.

G.P.O., Sydney: Architect: Commonwealth Works Department.

Farmer & Co., Pitt St., Sydney—Architects: Robertson & Marks.

(Continued on next page)





**TEN-TEST**  
INSULATING BUILDING BOARD

## DETAILS OF TEN-TEST INSULATION AT FLOORS, CEILINGS AND ROOFS

DRAWING N°2  
15<sup>TH</sup> NOV. 1930.



## Ten-Test For Acoustical Correction

### (1) By Using Standard Ten-Test

Ten-Test is unequalled for the acoustic treatment of churches, talkie theatres, auditoriums and the like. Professor G. R. Anderson, of the Toronto University, gives the co-efficient of standard  $\frac{1}{16}$  in. Ten-Test as .35, based upon the standard frequency of 512 vibrations per second. The Bell Laboratories give the following co-efficients over a full range of frequencies.

Frequencies	128	256	512	1024	2048	4096
Absorption Co-efficients	.16	.25	.37	.42	.43	.48

The absorption coefficients given above are taken on the standard  $\frac{1}{16}$ -in. board.

### (2) By Using Special Acousti Ten-Test

A special acousti Ten-Test is available, which is especially manufactured for acoustical correction and sound-quietening, and when properly applied it makes possible the distinct hearing of speech and music free from echoes, thus being ideal for use in radio broadcasting studios and all types of public buildings.

Acousti Ten-Test gives the following coefficients over a full range of frequencies (Reverberation Chamber Test):—

Frequencies	64	128	256	512	1024	2048
Absorption Co-efficients	.415	.415	.48	.50	.50	.575

Authority: H. Vernon Taylor & Sullivan, Acoustic Consultants, Henty House, Little Collins Street, Melbourne.

The use of Acousti Ten-Test ensures the provision of adequate absorption from the lowest notes to the top of the vocal and instrumental register. This point cannot be given too much consideration in the selection of an acoustical corrective material, as it will ensure the best conditions obtainable both for music and speaking.

It should be noted that the relatively uniform lineal rate of absorption throughout the entire range of vibration frequencies is a far more desirable quality in an acoustical absorbing material than high peaks of efficiency for limited pitches.

Acousti Ten-Test is manufactured in 12 in. x 12 in. boards, and can be fixed either by nailing or cementing to any kind of a level base.

## Ten-Test as Plaster Base

### The New V-Notch Plaster Base Board

#### Description and Sizes

Ten-Test Insulating Plaster Base, with its surface that forms a natural bond with plaster, has been developed to meet the demand for an insulating base for plaster. Its V-edge is designed to eliminate any open spaces between boards, and provide one continuous wall surface. The patented notch, combined with this unique edge, prevents hairline cracks by eliminating straight, continuous joints. The bevelled edge at each notch gives additional bonding surface for the plaster between each sheet. The boards come in two sizes—16 x 35 $\frac{1}{2}$  in. and 16 x 47 $\frac{1}{2}$  in., for studding at 18 and 16 in. centres respectively.

#### Application

Apply Ten-Test to ceiling first, then on the walls, nailing boards at 6-in. centres with 1 $\frac{1}{2}$ -in. galvanised nails. Place Ten-Test with the smooth face outwards to receive plaster, the grooved edge being uppermost. The boards shall extend lengthwise across studs or joist, the interlocking V-edges making a uniformly tight wall. Break all joints at centres of studs. Reinforce external angles with galvanised corner beads. Cover internal angles with strips of expanded metal lath.

#### Plastering on Ten-Test Insulating Base

Do not wet Ten-Test V-notch Insulating Plaster Base boards before applying plaster. Only recognised hardwall plaster should be used on Ten-Test, and manufacturer's specification followed. Do not use lime plaster, either alone or mixed with gypsum, for the first coat. Apply plaster directly to Ten-Test. First and second coats together shall not be less than  $\frac{3}{4}$  in. thick, and must be thoroughly dry before applying finish coat. Derby strokes must be made in the direction of studs and joists, with the derby float spanning two joists or studs. Thoroughly ventilate room.

## Ten-Test as an Insulating Base for Linoleum

### Generally

Ten-Test Boards provide an excellent base for Linoleum. The boards are cheaply laid, and effectively cover irregularities of the floor surface. The upper surface of boards remain perfectly level, thus preventing any tendencies of cracking or waving of the linoleum.

### ARCHITECT'S SPECIFICATIONS

#### TEN-TEST LINOLEUM BASE AT WOOD FLOORS.

Note.—First specify the names of compartments to have Ten-Test linoleum bases.

(a) The above rooms shall have insulating linoleum bases formed with a layer of standard Ten-Test Insulating Boards ..... in. thick.

(b) The floor must be dry and broom-cleaned, securely nailed, and openings, knot-holes, filled with a filler.

(c) Ten-Test Boards shall be applied to wood floor with either linoleum cement or hot asphalt (30 lbs. to 100 sq. ft.). The boards shall be laid with the joints at a moderate contact, using weights or weighted roller to firmly press in place; or

(d) Ten-Test Boards shall be laid by nailing to floor with shingle nails spaced at about 12 in. apart along centres and all four edges of each board.

Note.—Strike out either (c) or (d) as desired.

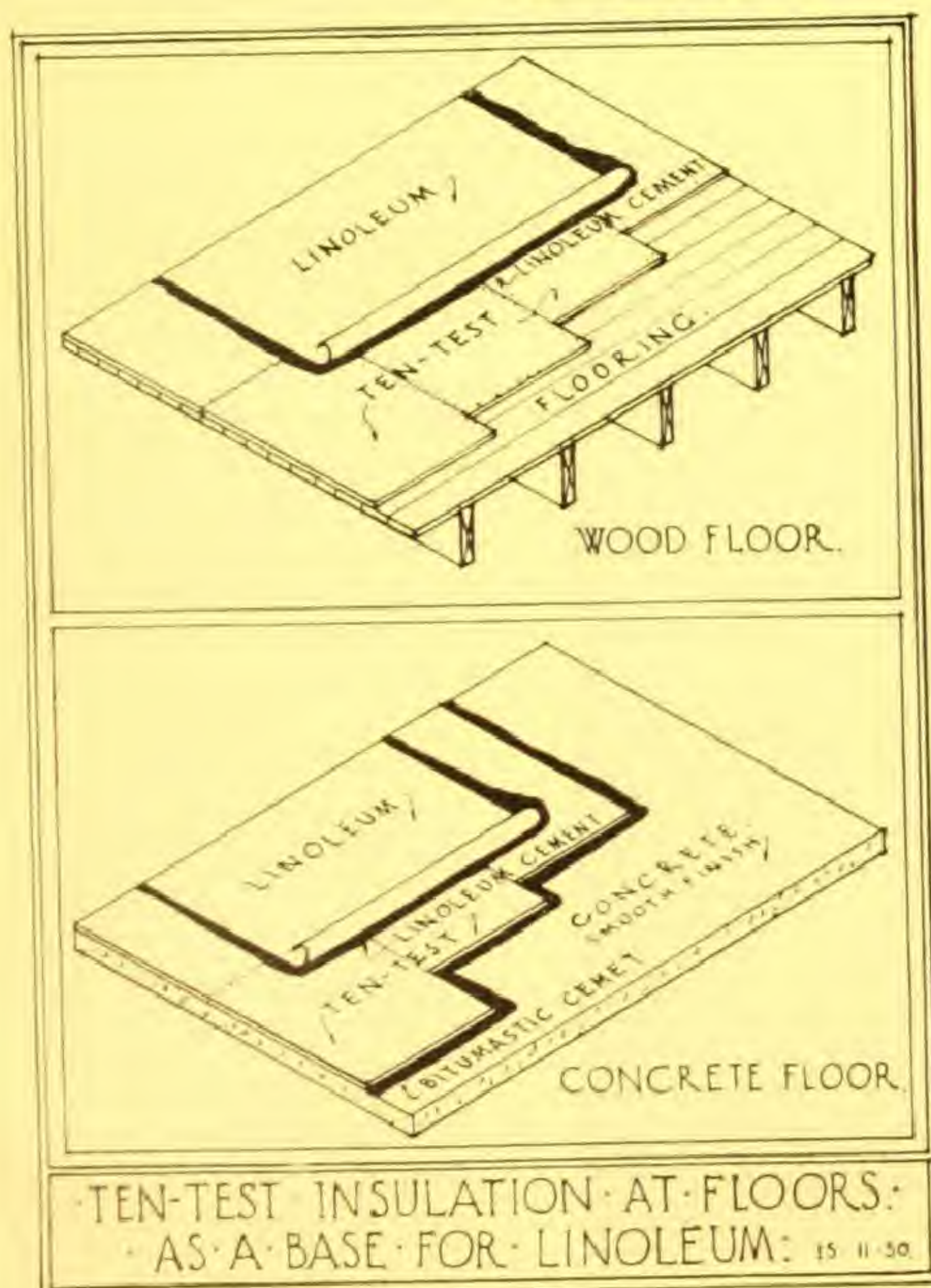
(e) Linoleum shall be cemented to Ten-Test with an approved brand of linoleum cement, and the surface rolled after setting.

#### TEN-TEST LINOLEUM BASE AT CONCRETE FLOORS.

(a) Use paragraph (a)

(b) The concrete floor must be dry and broom-cleaned, and given a coat of hot asphalt (30 lbs. to 100 sq. ft.). Apply Ten-Test to hot asphalt, pressing firmly in place, and bringing all joints to a moderate contact. Apply weights to hold boards in place until asphalt hardens, or use a weighted roller.

(c) Use paragraph (e).





<p><b>37b</b></p> <p>S.A.A. File No.</p>	<p align="center"><b>NEWALL'S INSULATION CO. LTD.</b></p> <p align="center"><i>Washington Station, Co. Durham, England</i></p> <p align="center">INSULATION DISTRIBUTORS:</p> <p>VICTORIA AND TASMANIA: H. Perks &amp; Co. Pty. Ltd., 31 Queen Street, Melbourne, Vic.</p> <p>QUEENSLAND: Queensland Machinery Co. Ltd., 142-156 Albert Street, Brisbane, Qld.</p> <p>NEW SOUTH WALES: John Carruthers &amp; Co., 33 Macquarie Place, Sydney, N.S.W.</p> <p>SOUTH AUSTRALIA: Parsons &amp; Robertson Ltd., 172 Pulteney Street, Adelaide, S.A.</p>	<p align="center">NEWALL'S 85% MAGNESIA</p>
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## Products

Insulating products of 85 per cent. Magnesia in slab, plastic, block and sectional forms; Asbestos Mattresses, Detachable Flange Covers, Newtempheit High Temperature Insulation, Nonpareil Insulating Bricks and Cements; Cork sheets and sectional cork pipe coverings, etc.

## Proper Insulation for Heating Systems

The efficiency of any steam or hot water heating arrangement is largely dependant on the economical distribution of the heat transferring medium, and this cannot be effected without suitable heat insulation of the supply mains.

Proper insulation of the supply lines enables hot water or steam to reach the farthest point of the building with a minimum reduction in temperature. Every badly-insulated or bare pipe is a heat-losing pipe, dispersing valuable heat units where they are not wanted from every square inch of surface. These losses can only be eliminated by correct insulation.

## Newall's 85% Magnesia "Empire" Sections

The "Empire" Section is a moulded cylinder of 85 per cent. Magnesia, split longitudinally into halves, and made to fit all pipe sizes. It has an asbestos fabric bonded into the exterior surface of the magnesia, and so arranged that both faces of the joints are covered. The outside is further strengthened and protected by a special compound giving a firm, dustless finish of an attractive buff colour. Each section is provided with two flexible metal fixing bands by which it is clipped to the pipe. The sections are moulded, having an insulating wall thickness of  $\frac{3}{4}$  in. or 1 in. as is necessary, dependent upon the water or steam temperature.

## Heat Conductivity

Newall's 85 per cent. Magnesia has a very low heat conductivity, viz.:—K—0.432 B.T.U.'s per sq. ft. per hour per one degree F temperature difference for one inch thickness at a mean temperature of 200 degrees F.

## Method of Fixing

"Empire" Sections can be easily applied by any unskilled man. He simply cuts the binding thread, opens out the Section, places it round the pipe and clips the fixing bands. No protective coat of composition or canvas is required, and the Sections can be removed and replaced without injury.

## "Empire" Sections versus Composition Lagging

The following paragraphs briefly compare the qualities of "Empire" Sections with composition lagging:—

### 1. EFFICIENCY.

Composition lagging requires to be applied in a much greater thickness than "Empire" Sections to reduce heat losses to the same amount. Figures, confirmed by the National Physical Laboratory of England, show that heat losses from  $\frac{3}{4}$ -in. "Empire" Sections are less than half of those radiated by one inch of composition material. While hair felt is more efficient than composition lagging, it has the serious objection of being a harbinger of dirt, dust and vermin. These defects are overcome by the use of "Empire" Sections. Insulated with "Empire" Sections, any heating apparatus will require less fuel than when composition lagging is used.

### 2. APPLICATION.

Composition lagging in plastic form requires to be mixed with water to a pasty mass, and necessitates the employment of a skilled workman in order to prevent the daubing of floors and walls with the plaster material, particularly if the heating pipes are close to the wall, as they generally are. Pipes need to be hot to successfully apply plaster insulation, but "Empire" Sections can be applied to the pipes when cold without any mess and dirt or skill required on the part of the workmen.

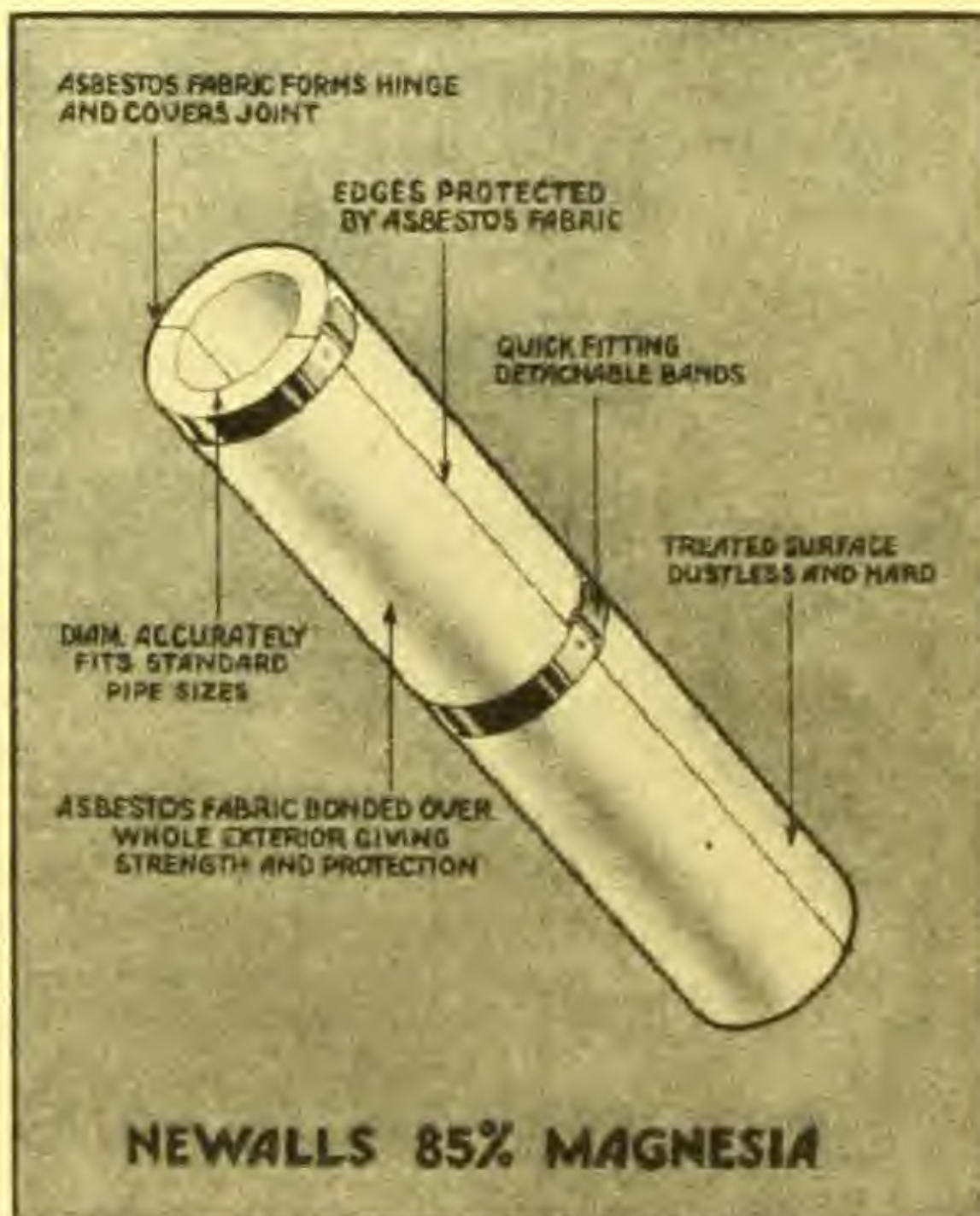
### 3. APPEARANCE.

The smaller thickness of "Empire" Sections allow the pipes to be put closer together, and are therefore less obtrusive. The fixing bands have a neat appearance, and the prepared surface takes paint very easily, needing approximately one-third of the usual quantity. One coat of bituminous paint enables the sections to be used for outdoor work.

## Cost

Tests made by the National Physical Laboratory of England show that the insulating value of  $\frac{3}{4}$  in. of Newall's 85 per cent. Magnesia is almost equal to 2 in. of ordinary composition.

Consider the comparative quantities need to insulate a 3-in. bore pipe, 100 ft. long. The relative cross sections are 34.4 sq. ins. of composition and 10 sq. ins. of 85 per cent. Magnesia, making 24 cub. ft. and 6.9 cub. ft., respectively. Average composition weighs 53 lbs. per cub. ft., against 12 lb. for 85 per cent. Magnesia, thus requiring 1,275 lbs. to obtain the same degree of insulation as 82.8 lbs. of Newall's material, or over 15 times as much. Therefore, in purchasing insulating material by weight, the price per ton can be very deceptive, as shown.



## ARCHITECT'S SPECIFICATION

No insulating covering shall be applied until pipe work has been tested for tightness and approval. All hot water and steam piping (except horizontal radiator connections, and where otherwise specified) shall be covered with Newall's  $\frac{3}{4}$  in. (or 1 in.) "Empire" 85 per cent. Magnesia Sections, provided and fixed complete with detachable bands spaced at 18 in. centres. All bends and valves (except radiator valves) shall be covered with Newall's specially shaped 85 per cent. Magnesia fittings.



## THIS COMPLETES THE 1931 EDITION OF RAMSAY'S ARCHITECTURAL CATALOGUE

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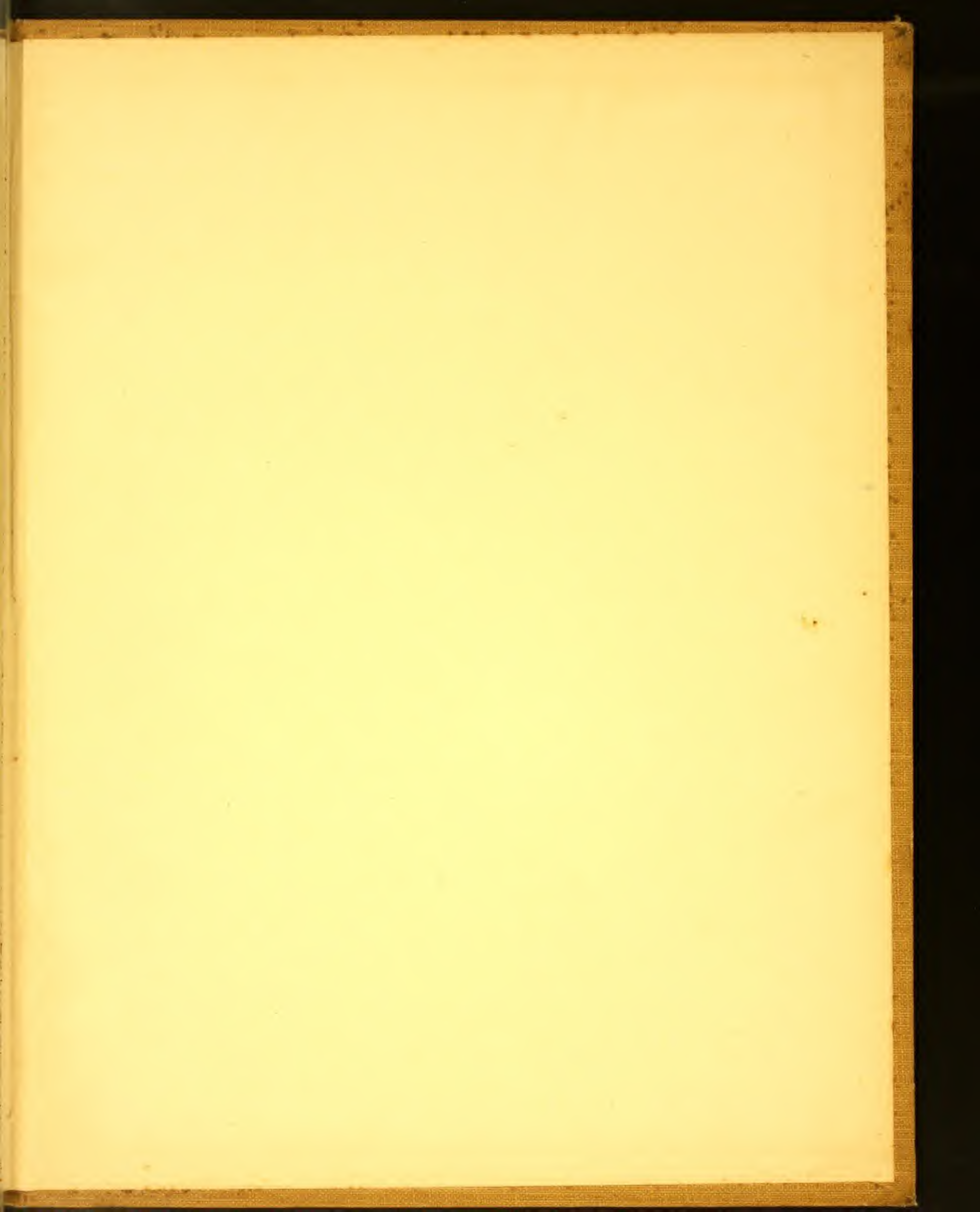
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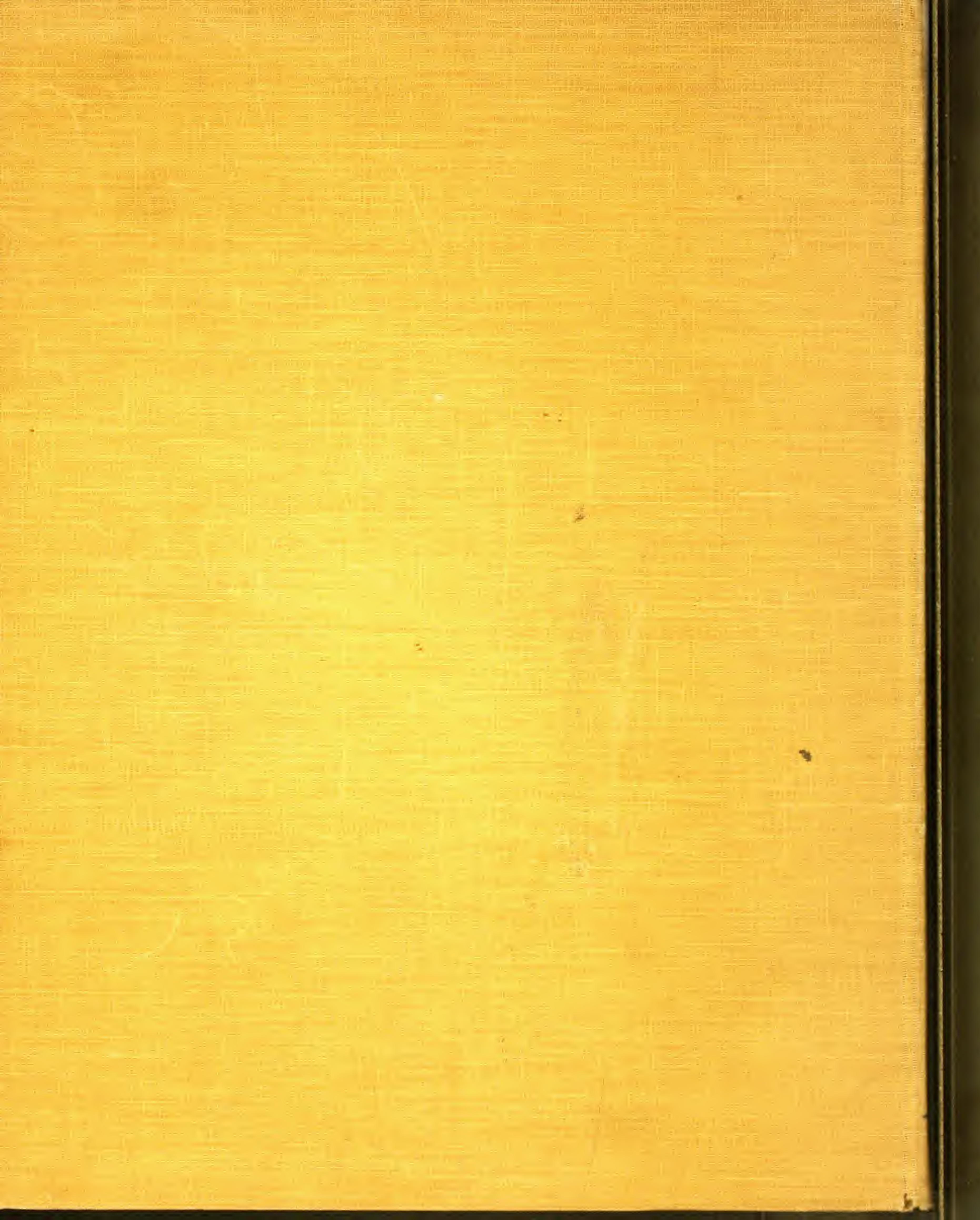














DATA—I BEAMS

(Rolled Steel Joists)

Section Modulus (Maximum)	Size in Inches	Weight lbs. per foot	Safe Distributed Load in Tons on Span of 1 ft.
1.14	3 x 1½	4	5.9
1.7	3 x 2½	5.7	9.1
1.83	4 x 1½	5	9.8
2.66	4 x 2	7	15.8
3.89	4 x 3	10	20.7
4.36	5 x 2½	9	23.2
6.996	6 x 3	12	37.3
10.01	6 x 4½	20	53.4
10.26	7 x 3½	15	54.7
13.94	8 x 4	18	74.1
15.06	6 x 5	25	80.3
18.03	9 x 4	21	96.1
24.47	10 x 4½	25	130.4
28.76	8 x 6	35	153.3
34.49	12 x 5	30	183.8
40.26	10 x 6	40	218.3
43.62	13 x 5	35	232.5
46.25	9 x 7	50	246.5
53.87	14 x 5½	40	287.1
57.74	10 x 8	55	307.8
65.59	15 x 6	45	343.6
68.98	10 x 8	70	367.7
77.26	16 x 6	60	411.8
81.30	12 x 8	65	433.3
93.53	18 x 6	55	499.2
122.62	20 x 6½	65	653.6
152.4	22 x 7	75	812.3
203.6	24 x 7½	90	1085.2
215.1	24 x 7½	100	1146.5

The load on any span is equal to the load on a 1 ft. span divided by the required span in ft.; example, 8 x 6 x 35 lbs. required safe load on 10 ft. span? Answer 1533 = 15.33 tons.

BRICKWORK COURSES

4 courses = 13½"

Courses	Vert. Height
1	3½"
2	6½"
3	10½"
4	1' 1½"
5	1' 4½"
6	1' 8½"
7	1' 11½"
8	2' 3"
9	2' 6½"
10	2' 9½"
11	3' 1½"
12	3' 4½"
13	3' 7½"
14	3' 11½"
15	4' 2½"
16	4' 6"
17	4' 9½"
18	5' 0½"
19	5' 4½"
20	5' 7½"
21	5' 10½"
22	6' 2½"
23	6' 5½"
24	6' 9"
25	7' 0½"
26	7' 3½"
27	7' 7½"
28	7' 10½"
29	8' 1½"
30	8' 5½"
31	8' 8½"
32	9' 0"
33	9' 3½"
34	9' 6½"
35	9' 10½"
36	10' 1½"
37	10' 4½"
38	10' 8½"
39	10' 11½"
40	11' 3"
50	14' 0½"
60	16' 10½"
70	19' 8½"
80	22' 6"
90	25' 3½"
100	28' 1½"
	0

A Companion to Ransay's Catalogue.

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Much thought and enterprise is embodied in this publication.

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- 75 complete specifications;
- 125 sets of tables and tabular matter;
- 600 pages
- 1,200 illustrations;
- 2,000 Architects', Engineers', Surveyors' and Contractors' offices will each receive a copy;
- 5,000 pounds is the estimated cost of producing this issue;
- 10,000 people will have access to its pages;
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